



Dedicated to protecting and improving the health and environment of the people of Colorado

To: Members of the State Board of Health

From: James Jarvis, Hazardous Materials and Waste Management Division
Jennifer Opila, Manager, Colorado Radiation Control Program

Through: Gary Baughman, Director, Hazardous Materials and Waste Management Division *JB*

Date: October 7, 2015

Subject: Request for Rulemaking Hearing
Proposed Amendments to 6 CCR 1007-1, Part 18, Licensing Requirements for Uranium and Thorium Processing with a request for the rulemaking hearing to occur in December of 2015

The Division is proposing amendments to regulatory part 18, titled *Licensing Requirements for Uranium and Thorium Processing*.

The regulatory part is being amended to ensure consistency with the 2014 and 2015 changes to the enabling legislation (statute), the Colorado Radiation Control Act. The 2014 changes were initiated by parties external to the Department. Following a 2014 audit by the U.S. Nuclear Regulatory Commission (NRC), additional items were found to be incompatible in statute. The Department then initiated changes to the statute which were finalized and approved during the 2015 legislative session. Changes are also being proposed to address NRC comments and to ensure compatibility with federal rule.

The proposed changes to Part 18 specifically address the modification, deletion, and addition of several definitions consistent with state statute and federal rule; add clarifying language for requirements which are under federal jurisdiction and state jurisdiction; add language allowing receipt of non-processing materials; add language pertaining to financial surety; and add requirements for spill notification and expedited groundwater restoration.

In mid-July, 2015, approximately 1,100 stakeholders were notified of the proposed rule amendment and were provided the opportunity to comment over a 60 day period. Additionally, three stakeholder meetings were held in August, 2015 in Denver, Montrose, and Canon City, Colorado to present and discuss the proposed changes. The stakeholder comment period remained open through September 16. To date, the Division has received written comments from six stakeholders pertaining to proposed changes.

The rule originally proposed to stakeholders eliminated the section on hearing requirements (in 18.6) with the intent to defer to the Colorado Administrative Procedure Act (APA) for such hearing process requirements. This was proposed as past legal filings have indicated the potential for conflicts between the Part 18 rule, the APA, and standard court proceedings. Stakeholders expressed concerns with this approach and the lack of detail in the APA and that it would potentially limit the public involvement in the hearing process or otherwise necessitate having legal counsel to participate in the hearing process. The Department disagrees that the proposed deletion of Section 18.6 would leave the public unable to participate in the hearing process. However, as a result of stakeholder concerns, the section on hearings is retained. Clarifying language was added to the initial paragraph of this section

to indicate that where there are conflicts, and as applicable, the particular hearing forum (e.g., court) requirements will apply.

Stakeholders have also expressed concerns regarding proposed language which specifies that some public process requirements apply only to the facilities new, renewal, or amendment application pertaining to receipt of material. Some stakeholders have expressed concern that license amendments for some activities may require a more robust public involvement process, similar to those applicable to receipt of material. The language used in the proposed rule is equivalent to that found in the RCA. The Division will continue to receive feedback from stakeholders as to why and when public processes are needed, and incorporate that into Division decision-making.

Further details of the proposed changes are listed in a Statement of Basis and Purpose and Specific Statutory Authority for the proposed rule, which, along with a Regulatory Analysis and supporting information, is available at:

<https://www.colorado.gov/pacific/cdphe/regulations-development-parts-1318>

At the October 21, 2015 request for rulemaking, the Radiation Program requests that the Board of Health set a rulemaking hearing for December 16 of 2015.

cc: Deborah Nelson, Administrator, State Board of Health

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STATEMENT OF BASIS AND PURPOSE
AND SPECIFIC STATUTORY AUTHORITY
for Amendments to

6 CCR 1007-1, Part 18, Licensing Requirements for Uranium and Thorium Processing

Basis and Purpose.

The Colorado Radiation Control Act, Title 25, Article 11, Colorado Revised Statutes (the Act), requires the State Board of Health to formulate, adopt and promulgate rules and regulations pertaining to radiation control.

Section 25-11-103 of the Act requires the Colorado Department of Public Health and Environment (Department) to develop and conduct programs for evaluation and control of hazards associated with the use of sources of ionizing radiation. Under this authority the Department requires registration of sources of ionizing radiation such as radiation machines and licenses governing the use of radioactive materials.

Section 25-11-104 of the Act requires Colorado's radiation regulations to be consistent with U.S. Nuclear Regulatory Commission (NRC) requirements necessary to maintain compatibility (and status as an Agreement State); and the Suggested State Regulations for Control of Radiation (SSRCR) of the Conference of Radiation Control Program Directors, Inc., except when the Board of Health concludes, on the basis of detailed findings, that a substantial deviation from the SSRCR is warranted. In some instances, maintaining consistency with the SSRCR may not be possible due to the model regulation being out of date with NRC changes, where no model regulation exists, where there are specific programmatic needs that differ greatly from the SSRCR, or where possible conflicts exist between the SSRCR and state statute. Colorado's Part 18 - is partially based upon SSRCR Part "U" (2015).

The Department is proposing changes to Part 18 to maintain consistency with the 2014 and 2015 Colorado Radiation Control Act (statutory) changes. Additionally, changes are being made to address past comments of the NRC, and to address changes to federal rule since Part 18 was last amended in 2011 to ensure consistency and compatibility with current federal rule.

The specific proposed Part 18 changes address:

- (1) The removal of several definitions/terms (classified material; long term care; post closure; and surveillance) which were deleted from the Radiation Control Act (RCA) or otherwise did not fit with the national regulatory framework of regulating Uranium and Thorium facilities;
- (2) The addition of definitions (byproduct material; residual radioactive material, and uranium milling), and modification of an existing definition for consistency with the language in the RCA and federal rule;
- (3) As requested by the NRC, clarifying language is added to indicate the Division of Reclamation, Mining and Safety are not implementing any Atomic Energy Act regulatory authority as this is reserved to the Radiation Program.
- (4) Modification of the phrase "environmental report" to "environmental assessment", consistent with RCA use of the term;
- (5) Consistent with statutory changes, add language allowing receipt of certain non-processing radioactive materials;
- (6) Clarification, streamlining, and updating of the public process requirements, consistent with the 2014 and 2015 statutory changes;

- (7) The addition of language to clarify the hearing process when there are conflicts between Part 18 and other rules;
- (8) The addition of provisions that require financial surety (for decommissioning) to be in place prior to commencement of operations; and
- (9) Consistent with RCA changes, requirement added for expedited restoration of groundwater wells to historic use levels;
- (10) Consistent with RCA changes, requirement added for reporting of any spill or release of toxic or radioactive materials; and
- (11) Correction of minor and cross-reference typographical errors throughout rule.

Specific Statutory Authority.

These rules are promulgated pursuant to the following statutory provisions: 25-1.5-101(1)(k), 25-1.5(1)(l), 25-11-103, 25-11-104, and 25-1-108, C.R.S.

SUPPLEMENTAL QUESTIONS

Is this rulemaking due to a change in state statute?

- Yes, the bill number is HB 15-1145 and SB 14-192 ;
rules are ___ authorized required.
 No

Is this rulemaking due to a federal statutory or regulatory change?

- Yes
 No

Does this rule incorporate materials by reference?

- Yes
 No

Does this rule create or modify fines or fees?

- Yes
 No

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**REGULATORY ANALYSIS
for Amendments to**

6 CCR 1007-1, Part 18, Licensing Requirements for Uranium and Thorium Processing

1. A description of the classes of persons who will be affected by the proposed rule, including classes that will bear the costs of the proposed rule and classes that will benefit from the proposed rule.

The Part 18 rule and proposed amendments pertain to and affect those facilities that are currently (or may in the future be) licensed by the Department to operate uranium and thorium processing facilities, including uranium mills. Uranium and thorium processing facilities licensed by the Department to process materials will bear the costs of the proposed amendments to the rule. Both the regulated entities (licensed facilities) and the Citizens of Colorado will benefit from the proposed rule changes by having rules and requirements that are aligned and consistent with state law and the national regulatory framework established for such regulated facilities. Having succinct and understandable requirements for the public processes, and the appeals to those processes will benefit the communities where licensed facilities may be located.

This rule would likely impact any facility operating to process uranium and thorium in the future, however, there are presently no such operating facilities in Colorado. Colorado has two former uranium processing licensees that have completed decommissioning, and are undergoing license termination. These two facilities will not be impacted by the proposed amendment. Colorado has one former uranium processing licensee that is currently undergoing decommissioning. New provisions for notification of spills and active restoration of groundwater wells will impact this licensee.

2. To the extent practicable, a description of the probable quantitative and qualitative impact of the proposed rule, economic or otherwise, upon affected classes of persons.

QUANTITATIVE IMPACTS

Many of the proposed changes are technical in nature and most are not expected to have a significant quantitative impact. The added, deleted, or modified definitions in the proposed rule will aid licensees by clarifying requirements and make them consistent with state statute and federal rule. Similarly, the added clarifying language throughout the rule is expected to enhance the understanding of the rule requirements.

The provision added to the proposed rule based on the 2014 RCA changes which mandates expedited and active restoration of wells affected by a contamination release from the facility may result in significant monetary expenses by impacted licensees. Systems for active treatment of groundwater tend to be highly variable in cost, are very site specific and depend upon the nature of the release, geologic characteristics of the area and the type of treatments used. Such systems can range in initial capital costs ranging from \$100,000 to \$1 million+ or more, plus additional annual maintenance costs which may be in the same cost range.

QUALITATIVE IMPACTS

The qualitative impact of the proposed changes is that the language and updated definitions will better align with the regulatory requirements contained in federal rule and those of other agreement states, making Colorado's requirements consistent -

notwithstanding differing statutory requirements - with the national regulatory framework.

3. The probable costs to the agency and to any other agency of the implementation and enforcement of the proposed rule and any anticipated effect on state revenues.

The rule requirements are enforced only by the Department. No other agency is expected to encounter costs as a result of the proposed changes.

The costs to the Department are not expected to change significantly as a result of the proposed changes. The added (statutorily driven) requirement for posting spill information on the website is expected to result in minimal effort and costs by the Department. Other rule changes which may require specific review by the Department would typically be recouped by the hourly fees charged.

4. A comparison of the probable costs and benefits of the proposed rule to the probable costs and benefits of inaction.

The anticipated/likely probable costs to the Department as a result of the proposed rule are those associated with posting of information pertaining to spills and releases. These costs are expected to require minimal effort that can be absorbed into the routine tasks of the radiation program. Less probable and unpredictable are the costs that licensees may encounter in implementing an active remediation system in the event of a groundwater release.

The benefits of amending the rule will be to address outstanding comments from the NRC and the alignment of terminology that is consistent with the national framework of regulating uranium and thorium processing facilities. The rule amendments will help ensure that Colorado's status as an agreement state is maintained. Additionally, the amended rule will bring the rule language and requirements into alignment with recent statutory changes.

Inaction on the proposed rule will result in potential conflict with statutory requirements and may jeopardize Colorado's agreement state status. Inaction would also limit Colorado's consistency with the national regulatory framework.

5. A determination of whether there are less costly methods or less intrusive methods for achieving the purpose of the proposed rule.

The purpose of the proposed rule changes is to align the requirements with recent statutory changes and to attain compatibility with federal rule. There are no less costly or less intrusive methods to achieve the purpose of the proposed changes, short of eliminating some provisions in the rule, which may result in conflict with statutory requirements.

6. Alternative Rules or Alternatives to Rulemaking Considered and Why Rejected.

The proposed rules are needed to achieve consistency with state statute and federal rules needed for compatibility as an agreement state. There are no alternate rules or alternatives to rulemaking that will achieve the goals and requirements.

7. To the extent practicable, a quantification of the data used in the analysis; the analysis must take into account both short-term and long-term consequences.

The short and long term consequences of not implementing the proposed requirements will be inconsistency with state law and continued incompatibility with federal rules and requirements needed to maintain status as an agreement state under NRCs program.

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STAKEHOLDER COMMENTS
for Amendments to

6 CCR 1007-1, Part 18, Licensing Requirements for Uranium and Thorium Processing

The following individuals and/or entities were included in the development of these proposed rules:

On July 17, 2015, approximately 1,100 stakeholders were notified of the opportunity to comment on the proposed draft rule over a 60 day period. The entities notified represented:

- Approximately 550+ Stakeholders who have previously participated in stakeholder processes associated with uranium facilities, and Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) groups;
- Approximately 300+ radioactive materials licensees;
- Approximately 278+ “other stakeholders” representing individuals who have specifically signed up to receive notification of proposed radiation regulation changes and who represent a wide variety of interests. These stakeholder entities include: x-ray registrants, radioactive materials licensees; private citizens; private companies; professional organizations; and special interest groups.

Stakeholder meetings were also held mid-way through the comment period in Denver, Montrose, and Canon City, providing stakeholders the opportunity to ask questions and provide comments on the proposed rule changes.

This rulemaking includes a state mandate on Boards of County Commissioners. A local Board of County Commissioners participates in licensing processes and activities associated with certain licensing actions. Board of County Commissioner participation is mandated by Section 25-11-203, C.R.S. This mandate exists in current rule. The proposal does not include a new local government mandate or an increase in the level of service. The proposed rule does include: the statutory language that a Board of County Commissioners may be reimbursed by the applicant for any costs the board incurs to respond to the application and the statutory language that the applicant is responsible for the costs associated with the meetings held to receive public comment on the application.

The following individuals and/or entities were notified that this rule-making was proposed for consideration by the Board of Health:

In addition to the notice of opportunity to comment on the proposed rule discussed above, stakeholders were provided with the anticipated rulemaking schedule for both the request for rulemaking and the rulemaking hearing dates. This rulemaking timeline information is also posted on the Department website area specific to the rule changes. A formal notice of rulemaking will be issued upon initial approval by the Board of Health during a request for rulemaking hearing.

Summarize Major Factual and Policy Issues Encountered and the Stakeholder Feedback Received. If there is a lack of consensus regarding the proposed rule, please also identify the Department’s efforts to address stakeholder feedback or why the Department was unable to accommodate the request.

Stakeholders have expressed some concern over the original rule proposal to defer to the Colorado Administrative Procedure Act (APA) for requirements specific to the hearing process and the proposed elimination of more explicit requirements found in the current rule. Since some individual courts have their own written procedures for hearings, the original concept

was to avoid conflict between these existing court procedures and the rule. Additionally, past legal filings have indicated the potential for conflicts between the current Part 18, the APA, and standard court proceedings. As a result of stakeholder concerns, the section on hearings is retained. Additional language is added to clarify that where available and applicable, the procedures of the particular hearing forum would apply rather than the Part 18 hearing requirements.

Stakeholders have also expressed concerns regarding proposed language which specifies that some public process requirements apply only to the facilities new, renewal, or amendment application pertaining to receipt of material. The concern is that license amendments for some activities may require a more robust public involvement process, similar to those applicable to receipt of material. The language used in the proposed rule is equivalent to that found in the RCA which specifies that the more robust public processes apply to the facilities receipt of material. It should be recognized that the Division will consider stakeholder feedback when determining the level of public process needed.

The table below outlines the specific comments received during the stakeholder process, and the Department’s response to those comments. Due to the parallel rulemaking of this regulatory part with other regulatory parts, and the overlapping nature of certain proposed provisions or topics, some information may overlap and also appear in other rule part documents.

The following table is an outline of the comments received during the stakeholder comment period and the response to those comments.

#	Rule Part(s)	Topic	Summary of Comment(s)	Department Response
18A	Parts 1,3,18	Rules deviate from Conference of Radiation Control Program Directors (CRCPD) Suggested State Regulations for Control of Radiation (SSRs)	CDPHE proposes deviation from the model rules but there is no explanation as to what the substantial deviation is for in this rulemaking. A description of what is in the model regulation followed by a description of the deviation is required.	Section 25-11-104 of the Act requires Colorado’s radiation regulations to be consistent with U.S. Nuclear Regulatory Commission (NRC) requirements necessary to maintain compatibility (and status as an Agreement State); and the Suggested State Regulations for Control of Radiation (SSRCR) of the Conference of Radiation Control Program Directors, Inc., except when the Board of Health concludes, on the basis of detailed findings, that a substantial deviation from the SSRCR is warranted. In some instances, maintaining consistency with the SSRCR may not be feasible due to the model regulation being out of date with NRC changes, where possible conflicts exist between the SSRCR and state statute, where no model regulation exists, where there are specific programmatic elements or business processes that differ greatly from the SSRCR. The Radiation Control Act (RCA) does not require the Department

				to indicate each deviation from the SSRCR, however in some cases, where staff has found it would be helpful, notes have been provided in the side margins of the proposed revised regulations.
18B	Part 18	Procedural rules pertaining to licensing hearing process	<p>Several stakeholders representing different public interest/stakeholder groups are opposed to the proposed elimination of section 18.6 of Part 18 pertaining to the public hearing process.</p> <p>The proposal to eliminate the rule section pertaining to license hearings is not justified and should be withdrawn. Elimination of the hearing section will result in confusion leaving the public unable to participate in the hearing process.</p>	<p>The Department is committed to having an open and fair public process that is consistent with federal law, state law, and Colorado’s agreement with NRC. Although the Department disagrees that the deletion of Section 18.6 would leave the public unable to participate in the hearing process, In response to these comments, the Department has retained the hearing procedure provisions of Section 18.6 (now 18.7) of the Regulations. Additionally, the Department has added language to Section 18.7.1 to clarify that in the event of a conflict between the procedures of an administrative court and 18.7, the procedures of the court will be followed.</p> <p>A commenter cited the public process requirements specified in the regulations of some other Boards and Commissions involved in oversight of or regulatory development processes of the Department. In review of the Board specific regulations applicable to some Department activities, it is clear that these other Boards/Commissions have specific authority that goes beyond rulemaking and covers some activities or decisions made by the applicable division. While the Board of Health provides for the rulemaking process over radiation regulations, it does not have authority over facility specific activities of the radiation program, such as licensing or registration related activities. The Radiation Control Act does not specify a specific board or commission for adjudicatory hearings for radiation matters; the RCA instead defers to the APA for hearing matters.</p>
18C	Part 18	Applicant	All major license	The proposed requirements for

		<p>environmental assessment for reclamation plans, and hearings for reclamation and decommissioning plans</p>	<p>amendments should be subject to a meaningful public hearing process. The proposed regulations eliminate the opportunity for a hearing for significant changes such as reclamation and decommissioning plans for a licensed facility.</p> <p>Missing from the list of actions that require an applicant’s environmental assessment is reclamation plans.</p> <p>A commenter also cited the requirements of a 1991 NRC, EPA, and Agreement State Memorandum of Understanding (MOU) as it related to public processes and reclamation plans.</p>	<p>environmental assessments, public meetings and hearings are consistent with the Radiation Control Act. As such, the requirements for public meetings outlined in section 18.3.8 are required for new or renewal applications for source material milling, amendments pertaining to the receipt of material or an amendment that would result in significant changes as outlined in 18.3.5.3. The language pertaining to the threshold at which an applicant’s environmental assessment is consistent with the language of the suggested state regulations Part U.</p> <p>It is not necessary or practical for all license amendments to be subject to a rigorous public process as some amendments are minor in nature such as approval of a new authorized user. That being said, the Department routinely conducts public meetings outside of the requirements of part 18.3.8 when it is considering an application that may have a significant impact on stakeholders. For example, the Department conducted a series of public meetings when considering approval of the decommissioning funding plan for the Energy Fuels Uranium Mill in 2013.</p> <p>Additionally, the requirements of section 3.8.8. require the applicant to prepare an environmental assessment for any application for the conduct of any activity which will affect the quality of the human environment by reason of exposure to radiation. A change to the decommissioning and reclamation plan most likely would meet this requirement, depending on the extent of the change.</p> <p>Most licensing decisions are subject to appeal under the Administrative Procedures Act.</p> <p>The 1991 MOU was an agreement signed by applicable federal and state agencies and pertained to the closure of former uranium</p>
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				<p>milling sites and the establishment of radon caps to limit exposure/releases within a specific timeline. The MOU did require for these specific applications, a public process. However, the actions under the MOU were completed and the MOU is no longer in effect. The Department believes that the intent of the MOU was to put forth certain requirements - including those for public notification - only until the required actions were completed and not to be applied for all time periods in the future. No change to the proposed rule was made as a result of this comment.</p>
18D	Part 18	Contents of Licensee's Environmental Assessment	<p>To be consistent with Federal Law, the requirement for content of the applicant's environmental report in the revised section 18.3.5.4 should include:</p> <ol style="list-style-type: none"> 1. An evaluation of alternatives, including alternative sites and engineering methods, to the proposed licensing activities. 2. An analysis of the long-term impacts, including decommissioning, decontamination, and reclamation impacts, including the management of any byproduct material. 	<p>The content in revised section 18.3.5.4 has not changed with this revision and is consistent with Section 25-11-203(1)(b)(III)(2)(c). The topics suggested by the comment to be added are evaluated in the Department's Environmental Impact Analysis as required by Section 18.4.1.3 and 18.4.1.4. No change to the proposed rule was made as a result of this comment.</p>
18E	Part 18	Contents of Department's Environmental Impact Analysis	<p>Sections 18.4.1.1 to 18.4.1.4 should be revised to be more consistent with Federal Law.</p>	<p>Sections 18.4.1.1 to 18.4.1.4 have not been changed with this revision and are essentially the same as the wording suggested by the comment. No change to the proposed rule was made as a result of this comment.</p>
18F	1, 18	<p>Definitions of "source material milling" and "uranium milling"</p> <p>[^a existing Part 1 definition; ^b proposed Part 18 definition]</p>	<p>The definitions in the radiation regulations regarding possession, processing, and disposal of mined uranium ore and its waste are ambiguous, somewhat contradictory both internally as well as with federal law, duplicative, or</p>	<p>The proposed definition (for uranium milling) was requested to be added to Part 18 by NRC as a matter of compatibility and is specific to Part 18 which provides requirements specific to uranium and thorium processing facilities. The regulations of Part 3 - where the term source material milling is used most often - is a more broad</p>

			<p>incomplete.</p> <p>The proposed definition of “uranium milling” (Part 18) is functionally equivalent to the existing definition of “source material milling”. If source material milling refers to other activities rather than the processing of uranium and thorium ore source material, this should be clarified.</p> <p>The commenter stated that the NRC general counsel has found the uranium milling definition confusing and that they have proposed an alternative working definition.</p>	<p>regulation encompassing licensing activities that include but go beyond uranium milling. As the commenter indicated, the definitions are functionally similar. However, NRC has specifically directed Colorado to incorporate the uranium milling definition into its Part 18 rule. The Department agrees that the terms are somewhat redundant, however does not see how this redundancy will hamper implementation. No change to the proposed rule was made as a result of this comment.</p>
18G	1, 18	Definition for “byproduct material”	<p>The language used in the definition of “byproduct material” appears clearly understandable and unambiguous, but it opens many questions as to its meaning.</p>	<p>The definition of byproduct material as used in Part 18 defers to a specific, applicable portion of the definition found in Part 1. The full definition found in Part 1 is based upon the language of state statute and is consistent with the federal rule definition of NRC.</p> <p>The commenter identified further detailed definitional information pertaining to the term “beneficiation” through reference to EPA rule 40 CFR 261.4(b)(7). While this requirement applies under EPA jurisdiction, NRC has not incorporated this definition into its rules.</p> <p>The Department is bound by state law, which includes definitions for “ore” and “byproduct material”, and the requirements, including definitions, of NRC necessary to maintain compatibility. No change to the proposed rule was made as a result of this comment.</p>
18H	18	Part 12 schedule of fees	<p>The description and license fee schedule for radioactive material licensees found in Appendix 2.A2 of Part 12, Source Material, does not include non-conventional milling</p>	<p>This comment is outside of the scope of this rulemaking. No change to the proposed rule was made as a result of this comment.</p>

			activities that meet the proposed Part 18 definition of uranium milling	
18I	18	Applicability of Part 18 standards	Recently proposed non-conventional processes do produce waste meeting the definition of byproduct material -- for example, Impact Ablation and Underground BoreHole Mining -- and must be held to the same standards and criteria as conventional mills and tailings storage facilities as described in Appendix A of Part 18	This comment refers to the implementation of the regulations and is outside the scope of this rulemaking. No change to the proposed rule was made as a result of this comment.
18J	Non-regulation		A commenter provided numerous documents pertaining to specific facilities in Colorado as well as facilities outside Colorado many of which are not regulated by the Department.	The information provided did not clearly address any specific changes to the proposed rules. No change to the proposed rules was made as a result of the information submitted.

Please identify health equity and environmental justice (HEEJ) impacts. Does this proposal impact Coloradoans equally or equitably? Does this proposal provide an opportunity to advance HEEJ? Are there other factors that influenced these rules?

The proposed rule changes impact Coloradoans equally and equitably. The proposed rule amendments are primarily technical in nature and do not provide specific opportunities to advance HEEJ, although inherent in the rules are certain requirements for protection of the environment and public health and safety. The proposed rule changes are based upon the 2014 and 2015 statutory changes, and changes to federal rule.

1 DRAFT 1 10/07/15

2 DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

3 Hazardous Materials and Waste Management Division

4 RADIATION CONTROL - LICENSING REQUIREMENTS FOR URANIUM AND THORIUM
5 PROCESSING

6 6 CCR 1007-1 Part 18

7 Adopted by the Board of Health December 16, 2015

8 [Editor's Notes follow the text of the rules at the end of this CCR Document.]

10 PART 18: LICENSING REQUIREMENTS FOR URANIUM AND THORIUM PROCESSING

11 18.1 Purpose and Scope.

12 18.1.1 The regulations in this part establish criteria, terms and conditions upon which the Department
13 issues licenses to receive title to, receive, possess, use, transfer, or deliver source and byproduct
14 materials as defined in this part, to operate uranium and thorium processing facilities and for the
15 disposition of the resulting byproduct material. The requirements of this part are in addition to,
16 and not in substitution for, other applicable requirements of these regulations.

17 18.1.2 This part establishes performance objectives and procedural requirements applicable to any
18 uranium or thorium material processing operation, to waste systems for byproduct material as
19 defined in this part as in definition (2) of 1.2.2, and to related activities concerning uranium-bearing
20 and thorium-bearing materials. It establishes specific technical and financial requirements for
21 sitingsitting, construction, operation, and decontamination, reclamation and ultimate stabilization,
22 as well as requirements for license transfer and termination, long-term site monitoring and
23 surveillance, and ownership and ultimate custody of source material milling facilities and
24 byproduct material impoundments.

25 18.1.3 The requirements of this part apply to byproduct material as defined in this part, that is located at
26 a site where milling operations are no longer active, if such site is not covered by the remedial
27 action program of Title I of the Uranium Mill Tailings Radiation Control Act (UMTRCA) OF 1978
28 (92 STAT. 3021; 42 U.S.C. 7901). The regulations in this part do not establish procedures and
29 criteria for the issuance of licenses for materials covered under Title I of the Uranium Mill Tailings
30 Radiation Control Act of 1978 (92 Stat. 3021) ~~unless that program fails to accomplish remedial~~
31 ~~action~~. Disposal at a uranium or thorium processing site of radioactive material which is not type 2
32 byproduct material must not inhibit reclamation of the tailings impoundment or the ability of the
33 U.S. Government to take title to the impoundment as long-term custodian.

34 18.1.4 Nothing in this Part ~~applies~~shall apply to, includes, or affects the following naturally occurring
35 radioactive materials (NORM) or technologically enhanced naturally occurring radioactive
36 materials (TENORM):

37 18.1.4.1 ~~Residuals or sludges from the treatment of drinking water by aluminum, ferric chloride,~~
38 ~~or similar processes; except that the material may not contain hazardous substances~~
39 ~~that otherwise would preclude receipt;~~

40 18.1.4.2 Sludges, soils, or pipe scale in or on equipment from oil and gas exploration, production,
41 or development operations or drinking water or wastewater treatment operations; except
42 that the material may not contain hazardous substances that otherwise would preclude
43 receipt;

Comment [JJ1]: EDITORIAL NOTE 1: ALL COMMENTS (SUCH AS THIS ONE) SHOWN IN THE RIGHT SIDE MARGIN OF THIS DOCUMENT ARE FOR INFORMATION PURPOSES ONLY TO PROVIDE ADDITIONAL INFORMATION AND TO AID THE READER IN UNDERSTANDING THE PROPOSED RULE DURING THE DRAFT REVIEW PROCESS.

THESE COMMENTS ARE **NOT** PART OF THE RULE AND ALL COMMENTS WILL BE DELETED PRIOR TO FINAL SUBMISSION.

Comment [JJ2]: This reflects the date of anticipated approval by the Colorado Board of Health. The effective date is approximately 60 days beyond this date, pending additional review and approvals.

This date is subject to change as determined by the Board of Health. Changes to this date will be properly reflected in the rule, as applicable.

Comment [JJ3]: Due to the added definition for "byproduct material" in 18.2 appearing subsequently in the rule, the wording here is clarified.

Similar changes are made in the rule up to the definition section 18.2.

Comment [JJ4]: This and three additional occurrences of this spelling error are corrected in the rule.

Comment [JJ5]: Proposed change deletes requirements which are no longer applicable. Based on Nuclear Regulatory Commission (NRC) comments - under the 274b Agreement, the State of Colorado does not have jurisdiction over Title I facilities.

Discussion with CDPHE remediation program staff indicated that this may have been initiated in the past due to uncertainty with UMTRCA process at the time.

Change made based on NRC letter dated 10/13/11 (# 18).

10 CFR 40.2a(b)
[Compatibility=A]
NRC Compatibility information can be found at: <https://scp.nrc.gov/regresources.html>

Comment [JJ6]: Language modified for consistency with 2015 statutory changes (Colorado Radiation Control Act) via House Bill 15-1145.

44 18.1.4.3 Materials from or activities related to construction material mining regulated under article
45 32.5 of title 34, CRS.

46 18.1.4.4 The treatment, storage, management, processing, or disposal of solid waste, which may
47 include NORM and TENORM, either pursuant to issuance of a certificate of designation
48 or considered approved or otherwise deemed to satisfy the requirement for a certificate of
49 designation.

50 18.1.5 The regulation of uranium in situ leach mining (in situ recovery), as defined in Section 34-32-103,
51 CRS., involves the Department of Natural Resources, Division of Reclamation, Mining and Safety
52 or their successor. The requirements of that agency may, due to the use of terms-of-art and other
53 technical words, phrases and definitions, be interpreted inconsistently or be held in conflict with
54 the Department's requirements. The Department will coordinate with that agency to the maximum
55 extent practicable to resolve any such conflicts or inconsistencies. An applicant or licensee that
56 identifies such inconsistency or conflict shall provide that information to both agencies for
57 resolution. The Department of Natural Resources, Division of Reclamation, Mining and Safety or
58 their successor, is not implementing any Atomic Energy Act regulatory authority under the Articles
59 of Agreement, Section 274, of the Atomic Energy Act of 1954, as amended.

60
61 18.1.6 License amendments for the receipt of classified-radioactive material at a facility are subject to
62 sections 18.3 and 18.4 except when the material is from an approved source and suchthe
63 amendment would not result in a change in ownership, design, or operation of the facility. License
64 amendments not subject to 18.3 and 18.4 of this part are subject to 18.5 of this section.

65 **18.2 As used in this regulation:**

66 "Active maintenance" means any significant activity needed during the period of long term care including
67 ongoing activities such as the pumping and treatment of water from a site or one-time measures such as
68 replacement of a disposal site's cover. Active maintenance does not include custodial activities such as
69 repair of fencing, repair or replacement of monitoring equipment, revegetation, minor additions to soil
70 cover, minor repair of disposal site cover, and general disposal site upkeep such as mowing grass.

71 "Aquifer" means a geologic formation, group of formations, or part of a formation capable of yielding a
72 significant amount of ground water to wells or springs. Any saturated zone created by uranium or thorium
73 operations would not be considered an aquifer unless the zone is or potentially is:

- 74 (1) hydraulically interconnected to a natural aquifer;
- 75 (2) capable of discharge to surface water; or
- 76 (3) reasonably accessible because of migration beyond the vertical projection of the
77 boundary of the land transferred for long-term government ownership and care in
78 accordance with Criterion 9 of Appendix A to this Part 18.

79 "As expeditiously as practicable considering technological feasibility", for the purposes of Criterion 6A,
80 means as quickly as possible considering: the physical characteristics of the tailings and the site; the
81 limits of available technology; the need for consistency with mandatory requirements of other regulatory
82 programs; and factors beyond the control of the licensee. The phrase permits consideration of the cost of
83 compliance only to the extent specifically provided for by use of the term available technology.

84 "Available radon barrier technology" means technologies and methods for emplacing a final radon barrier
85 on uranium mill tailings piles or impoundments. This term shall not be construed to include extraordinary
86 measures or techniques that would impose costs that are grossly excessive as measured by practice
87 within the industry (or one that is reasonably analogous), (such as, by way of illustration only,
88 unreasonable overtime, staffing, or transportation requirements, etc., considering normal practice in the
89 industry; laser fusion of soils, etc.), provided there is reasonable progress toward emplacement of the
90 final radon barrier. To determine grossly excessive costs, the relevant baseline against which cost shall
91 be compared is the cost estimate for tailings impoundment closure contained in the licensee's approved

Comment [JJ7]:
Statement is added to clarify that the Department of Natural Resources (DNR) does not have regulatory authority over radioactive materials under the Atomic Energy Act and the Articles of Agreement between the Atomic Energy Commission (now NRC) and the State of Colorado Radiation Program.

In a letter dated October 13, 2011 (Item 17), and as reaffirmed in a letter dated June 28, 2012 (item 17), the U.S. Nuclear Regulatory Commission (NRC) requested that the regulatory authority in relation to the Atomic Energy Act be clarified.

10 CFR 40.2
NRC Regulations can be found at:
<http://www.nrc.gov/reading-rm/doc-collections/cfr/>

Comment [JJ8]: Wording change consistent with 2015 statutory Radiation Control Act (RCA) changes via House Bill 15-1145.
CRS 25-11-203(1)(b)(III)

Comment [JJ9]:
The words "radon barrier" is deleted from this definition to be consistent with Appendix A of 10 CFR Part 40 wording. The original full definition language (including the words "radon barrier") are not used in Part 18, so no additional changes are necessary. The revised definition is currently used in Part 18 and those uses are consistent with 10 CFR Part 40.

NRC Compatibility = A
NRC letters dated 06/28/12 (#26); 10/13/11 (#26).

92 reclamation plan, but costs beyond these estimates shall not automatically be considered grossly
93 excessive.

94 "Byproduct Material" is the same as in definition (2) of 1.2.2 and means the tailings or wastes produced
95 by the extraction or concentration of uranium or thorium from any ore processed primarily for its source
96 material content, including discrete surface wastes resulting from uranium solution extraction processes.
97 Underground ore bodies depleted by such solution extraction operations do not constitute "byproduct
98 material" within this definition.

99 "Certificate of designation" means the approval pursuant to article 20 of title 30, CRS., or section 25-15-
100 204 (6).

101 "Closure" means the activities following operations to decontaminate and decommission the buildings and
102 site used to produce byproduct materials and reclaim the tailings and/or waste disposal area.

103 "Closure plan" means the Department approved plan to accomplish closure.

104 "Compliance period" begins when the Department sets secondary ground-water protection standards and
105 ends when the owner or operator's license is terminated and the site is transferred to the State or Federal
106 agency for long-term care.

107 "Dike" means an embankment or ridge of either natural or man-made materials used to prevent the
108 movement of liquids, sludges, solids, or other materials.

109 "Disposal area" means the area containing byproduct materials to which the requirements of Criterion 6 of
110 Appendix A to this Part 18 apply.

111 "Disposal site" means all land that is subject to transfer to a government agency after termination of the
112 license.

113 "Existing portion" means that land surface area of an existing surface impoundment on which significant
114 quantities of uranium or thorium byproduct materials had been placed prior to September 30, 1983.

115 "Facility" in this part means the physical location at one site or address and under the same administrative
116 control at which:

- 117 (1) the possession, use, processing or storage of uranium-bearing and thorium-bearing
118 radioactive material is or was authorized by license pursuant to this part; or
- 119 (2) uranium and thorium is milled, or otherwise processed and the resulting byproduct
120 material is dispositioned.

121 "Factors beyond the control of the licensee" means factors proximately causing delay in meeting the
122 schedule in the applicable reclamation plan for the timely emplacement of the final radon barrier
123 notwithstanding the good faith efforts of the licensee to complete the barrier in compliance with paragraph
124 (1) of Criterion 6A. These factors may include, but are not limited to:

- 125 (1) physical conditions at the site;
- 126 (2) inclement weather or climatic conditions;
- 127 (3) an act of god;
- 128 (4) an act of war;
- 129 (5) a judicial or administrative order or decision, or change to the statutory, regulatory, or
130 other legal requirements applicable to the licensee's facility that would preclude or delay
131 the performance of activities required for compliance;
- 132 (6) labor disturbances;

Comment [JJ10]:

Consistent with the approach used in 10 CFR Part 40, the definition for byproduct material is added. This approach eliminates the need to refer back to Part 1 for the definition throughout Part 18. As a result of this added definition, some current references to the Part 1 definition will be deleted.

The specific sub-definition of byproduct material is appropriate for uranium and thorium processing facilities regulated under Part 18.

NRC Compatibility = C
NRC Letter 01/14/14

- 133 (7) any modifications, cessation or delay ordered by state, federal, or local agencies;
134
- 135 (8) delays beyond the time reasonably required in obtaining necessary government permits,
136 licenses, approvals, or consent for activities described in the reclamation plan proposed
137 by the licensee that result from agency failure to take final action after the licensee has
138 made a good faith, timely effort to submit legally sufficient applications, responses to
139 requests (including relevant data requested by the agencies), or other information,
140 including approval of the reclamation plan; and
- 141 (9) an act or omission of any third party over whom the licensee has no control.
- 142 "Final radon barrier" means the earthen cover (or approved alternative cover) over tailings or waste
143 constructed to comply with Criterion 6 of this Appendix (excluding erosion protection features).
- 144 "Ground water" means water below the land surface in a zone of saturation. For purposes of Appendix A
145 to this Part 18, ground water is the water contained within an aquifer as defined above.
- 146 "Leachate" means any liquid, including any suspended or dissolved components in the liquid that has
147 percolated through or drained from the byproduct material.
- 148 "Licensed site" means the area contained within the boundary of a location under the control of persons
149 generating or storing radioactive materials under a Department license.
- 150 "Liner" means a continuous layer of natural or man-made materials, beneath or on the sides of a surface
151 impoundment, which restricts the downward or lateral escape of byproduct material, hazardous
152 constituents, or leachate.
- 153 ~~"Long term care" means the observation and maintenance of a site following the post closure period and
154 termination of the license.~~
- 155 "Milestone" means an action or event that is required to occur by an enforceable date.
- 156 "Monitoring" means observing and making measurements to provide data to evaluate the performance
157 and characteristics of a site.
- 158 "Operation" means that a uranium or thorium mill tailings pile or impoundment is being used for the
159 continued placement of byproduct material or is in standby status for such placement. A pile or
160 impoundment is in operation from the day that byproduct material is first placed in the pile or
161 impoundment until the day final closure begins.
- 162 "Point of compliance" is the site specific location in the uppermost aquifer where the ground-water
163 protection standard must be met.
- 164 ~~"Post closure" means the period of time from completion of the site closure plan for decontamination,
165 reclamation, and stabilization of the site and disposal area and prior to the termination of the license.~~
- 166 "Reclamation plan", for the purposes of Criterion 6A of Appendix A of this Part 18, means the plan
167 detailing activities to accomplish reclamation of the tailings or waste disposal area in accordance with the
168 technical criteria of Appendix A of this Part. The reclamation plan must include a schedule for reclamation
169 milestones that are key to the completion of the final radon barrier including as appropriate, but not limited
170 to, windblown tailings retrieval and placement on the pile, interim stabilization (including dewatering or the
171 removal of freestanding liquids and recontouring), and final radon barrier construction. (Reclamation of
172 tailings must also be addressed in the closure plan; the detailed reclamation plan may be incorporated
173 into the closure plan.)
- 174 ~~"Residual radioactive material" means:~~

Comment [JJ11]:
NRC has requested this definition be deleted from Part 18. Although the term is used in 10 CFR Part 40, NRC does not define the term. Retaining the definition in Colorado rules may result in non-compatibility with NRC requirements.

This term is used in 18.2, 18.6.1.2, and Criterion 6 of Part 18.

[NOTE: Although not defined in 10 CFR Part 40, the words "long term care" are used multiple times in 10 CFR 40 in 40.1, 40.2a, 40.3, 40.20, 40.27, 40.28, and Appendix A.]

NRC letters dated 06/28/12 (#20); 10/13/11 (#20).
10 CFR 40.4

Comment [JJ12]:
NRC has requested that the definition "post closure" be deleted from Part 18 since it is not defined in NRC's equivalent part (10 CFR 40). According to NRC, retaining the definition may result in conflicts with 10 CFR Part 40.

[NOTE: The term is used in Appendix A to 10 CFR Part 40 in Criterion 6 (7), but does not define it.]

Part 18 uses this term in Criterion 6(7) in a manner equivalent to Appendix A of 10 CFR Part 40.

NRC letter dated 06/28/12 (#21); 10/13/11 (#21).

Comment [JJ13]:
NRC has commented that the definition for "residual radioactive material" was omitted from Part 18 of the Colorado regulations. Continued omission of the definition may result in incompatibility with NRC regulations.

[The term is used in Part 3, 3.16.2.6 in a manner similar to use in the Conference of Radiation Control Program Directors (CRCPD) Suggested State Regulations for Radiation Control (SSRCR) Part C.32. The term is not currently used/found in Part 1 or in Part 18.]

NRC letter dated 06/28/12 (#22); 10/13/11 (#22)
NRC Compatibility = A

175 (1) Waste (which the Secretary of Energy determines to be radioactive) in the form of tailings
176 resulting from the processing of ores for the extraction of uranium and other valuable constituents
177 of the ores; and

178 (2) Other waste (which the Secretary of Energy determines to be radioactive) at a processing site
179 which relates to such processing, including any residual stock of unprocessed ores or low-grade
180 materials.

181 The term residual radioactive material is used only with respect to materials at sites subject to
182 remediation under title I of the Uranium Mill Tailings Radiation control Act of 1978, as amended.

183 "Surface impoundment" means a natural topographic depression, man-made excavation, or diked area,
184 which is designed to hold an accumulation of liquid wastes or wastes containing free liquids, and which is
185 not an injection well.

186

187

188 ~~"Surveillance" means the observation of the site for the purposes of visual detection of the need for~~
189 ~~maintenance, custodial care, evidence of unauthorized access, and compliance with other license and~~
190 ~~regulatory requirements.~~

Comment [JJ14]:
At the request of NRC, the specific definition for surveillance is deleted. NRC has stated that the Colorado definition is too narrow as it implies only "visual" types of surveillance. [The word is used in 18.1.2; Appendix A-criterion 2, 9C, and 9F].

The word "surveillance" is not defined in 10 CFR Part 40, although the word is used in several areas of Part 40 in a broad sense. NRC has stated that surveillance may include other activities besides visual observation, including monitoring and sampling.

NRC letters 06/28/12 (#23); 10/13/11 (#23).

191 "Third-party contractor" or "Third-party agreement" means a legal or contractual mechanism whereby an
192 applicant or licensee voluntarily agrees to pay for the services, solely selected and supervised by the
193 Department, of qualified persons not Department staff nor under contract directly to the Department.

194 "Uppermost aquifer" means the geologic formation nearest the natural ground surface that is an aquifer,
195 as well as lower aquifers that are hydraulically interconnected with this aquifer within the facility's property
196 boundary.

197 "Uranium milling" means any activity that results in the production of byproduct material as defined in Part
198 18.

Comment [JJ15]:
As required by NRC for compatibility, a definition for "uranium milling" is added. The definition is based on that found in 10 CFR Part 40.4.

NRC letters: 01/14/14 (#3); 06/28/2012 (#24); 10/13/11 (#24)

NRC Compatibility = A

199

200

201 **18.3 Special Requirements for Issuance of Specific Licenses For Source Material Milling.**

202 In addition to the requirements set forth in 3.8 and 3.9, a specific license for source material milling will be
203 issued if the applicant submits to the Department a complete and accurate written application that clearly
204 demonstrates how objectives and requirements of this Part are met. Failure to clearly so demonstrate
205 shall be grounds for refusing to accept an application. Any person desiring to have a facility or site
206 referred to in this Part shall apply to the Department for approval of such facility or site. The application
207 shall contain such information as the Department requires and shall be accompanied by an application
208 fee determined by the Board pursuant to the provisions of Part 12 of these regulations.

209 18.3.1 An application for a license or to amend or renew an existing license to receive, possess, and use
210 source material for milling or byproduct material ~~as in definition (2) of 1.2.2~~ shall include all
211 information required under these regulations and such other information as the Department may
212 deem necessary, and shall address the following:

213 18.3.1.1 Description of the proposed project or action;

214 18.3.1.2 Area/site characteristics including geology, topography, hydrology and
215 meteorology;

216 18.3.1.3 Radiological and nonradiological impacts of the proposed project or action,
217 including waterway and groundwater impacts;

- 218 18.3.1.4 Environmental effects of accidents;
- 219 18.3.1.5 Tailings disposal and decommissioning;
- 220 18.3.1.6 Site and project alternatives.
- 221 18.3.2 The applicant shall provide procedures describing the means employed to meet the following
- 222 requirements during the operational phase of any project.
- 223 18.3.2.1 Milling operations shall be conducted so that all releases are reduced to as low
- 224 as is reasonably achievable below the limits of Part 4.
- 225 18.3.2.2 The mill operator shall conduct at least daily inspection of any tailings or waste
- 226 retention systems. The inspection shall be performed by a person who is
- 227 qualified and approved by the Department. Records of such inspections shall be
- 228 maintained for review by the Department.
- 229 18.3.2.3 The mill operator shall immediately notify the Department of the following:
- 230 18.3.2.3.1 Any failure in a tailings or waste retention system which results in a
- 231 release of tailings or waste into uncontrolled areas; and
- 232 18.3.2.3.2 Any unusual conditions which are not contemplated in the design of the
- 233 retention system and which if not corrected could lead to failure of the
- 234 system and result in a release of tailings or waste into uncontrolled
- 235 areas.
- 236 18.3.3 During any one full year prior to submittal of a new application or amendment expanding the
- 237 facility the applicant/licensee shall conduct a preoperational monitoring program to provide
- 238 complete baseline data on a milling site and its environs. Throughout the construction and
- 239 operating phases of the mill, the applicant/licensee shall conduct an operational monitoring
- 240 program to measure or evaluate compliance with applicable standards and regulations, to
- 241 evaluate performance of control systems and procedures, to evaluate environmental impacts of
- 242 operation, and to detect potential long-term effects.
- 243 18.3.4 The environmental reportassessment required by 3.8.8 shall contain all information deemed
- 244 necessary by the agency to assist the agency in the evaluation of the short-term and long-range
- 245 environmental impact of the project and activity so that the agency may weigh environmental,
- 246 economic, technical, and other benefits against environmental costs, while considering available
- 247 alternatives. The environmental reportassessment shall be submitted with the license application
- 248 or amendment request, unless an exemption as provided by 3.8.7.1 has been obtained from the
- 249 Department.
- 250 18.3.5 The following types of actions require an applicant's environmental reportassessment:
- 251 18.3.5.1 Issuance erof a new or renewal of a source material milling license;
- 252 18.3.5.2 Each new, renewal or amendment application pertaining to the facility's receipt of
- 253 material;
- 254 18.3.5.~~3~~ Issuance of an amendment that would authorize or result in:
- 255 (1) A significant expansion of a site;
- 256 (2) A significant change in the types of releases;
- 257 (3) A significant increase in the amounts of releases;
- 258 (4) A significant increase in individual or cumulative occupational radiation exposure;
- 259 or

Comment [JJ16]: Wording is modified here and in subsequent sections, to be consistent with the language used in the Colorado Radiation Control Act for the document(s) submitted by the applicant which pertains to environmental concerns.

The term environmental assessment is changed to environmental report. The environmental report is the document submitted by the applicant or licensee.

Comment [JJ17]: Language modified for clarity.

Comment [JJ18]: This requirement has been relocated from 18.3.9, and 18.3.9.2 and language merged.

- 260 (5) A significant increase in the potential for or consequences from radiological
261 accidents.
- 262 18.3.5.43. ~~T~~The environmental assessment shall contain all information deemed necessary
263 by the department, and shall include, at a minimum:
- 264 (1) The identification of the types of ~~classified~~ material to be received, stored,
265 processed, or disposed of;
- 266 (2) A representative presentation of the physical, chemical, and radiological
267 properties of the type of ~~classified~~ material to be received, stored, processed, or
268 disposed of;
- 269 (3) An evaluation of the short-term and long-range environmental impacts of such
270 receipt, storage, processing, or disposal;
- 271 (4) An assessment of the radiological and nonradiological impacts to the public
272 health from the proposed activities;
- 273 (5) Any facility-related impact on any waterway and ground water from the proposed
274 activities;
- 275 (6) An analysis of the environmental, economic, social, technical, and other benefits
276 of the proposed activities against environmental costs and social effects while
277 considering available alternatives;
- 278 (7) ~~A~~ list of all material violations of local, state, or federal law at the facility since
279 the submittal date of the previous license application or license renewal
280 application;
- 281 (8) ~~F~~for an application for a license or license amendment ~~p~~ertaining to the facility's
282 receipt of ~~classified~~ material for storage, processing, or disposal at the facility, a
283 demonstration that:
- 284 (a) ~~T~~here are no outstanding material violations of any state or federal
285 statutes, compliance orders, or court orders applicable to the facility, and
286 any releases giving rise to any such violation have been remediated;
- 287 (b) ~~T~~he operator, after a good faith review of the facility and its operations,
288 is not aware of any current license violation at the facility;
- 289 (c) ~~T~~here are no current releases to the air, ground, surface water, or
290 groundwater that exceed permitted limits; and
- 291 (d) ~~n~~No conditions exist at the facility that would prevent the Department of
292 Energy's receipt of title to the facility pursuant to the federal "Atomic
293 Energy Act of 1954", 42U.S.C. sec. 2113;
- 294 (9) ~~A~~ list of all necessary permits and any changes to local land use ordinances
295 that are needed to construct or operate the facility; and
- 296 (10) ~~F~~for sites or facilities placed on the National Priority List pursuant to the federal
297 "Comprehensive Environmental Response, Compensation, and Liability Act", 42
298 U.S.C. sec. 9605, a copy of the most recent five-year review and any associated
299 updates that have been issued by the United States Environmental Protection
300 Agency.
- 301 18.3.6 An application for a license to receive, possess and use source material for milling or byproduct
302 material ~~as in definition (2) of 1.2.2~~ shall contain proposed specifications relating to the milling
303 operations and the disposition of tailings or wastes resulting from such milling activities to achieve

304 the requirements and objectives set forth in the criteria listed in Appendix A to this Part 18. Each
305 application for a new license or for license renewal must clearly demonstrate how the
306 requirements and objectives set forth in Appendix A to this Part 18 have been addressed. Failure
307 to clearly demonstrate how the requirements and objectives in Appendix A to this Part 18 have
308 been addressed shall be grounds for refusing to accept an application.

309 ~~A facility shall not dispose of or receive for storage incident to disposal or processing at the facility~~
310 ~~radioactive material, except for nonprocessing operational purposes such as radioactive~~
311 ~~standards, samples for analysis, or materials contained in fixed or portable gauges, unless the~~
312 ~~facility has received a license, a five-year license renewal, or license amendment pertaining to the~~
313 ~~facilities receipt of radioactive material, in accordance with the Administrative Procedures Act, for~~
314 ~~such receipt, storage, processing, or disposal of radioactive material and the license, license~~
315 ~~renewal, or license amendment approves the type of activity.~~

316 18.3.7 Nothing in ~~section 18.3 shall apply~~ applies to a contract for the storage, processing, or disposal of
317 less than the sum of one hundred ten (110) tons of ~~classified radioactive~~ material per source or to
318 a contract for a bench-scale or a pilot-scale testing project or a contract for less than a de minimis
319 amount of ~~classified radioactive~~ material as determined by the department for storage,
320 processing, or disposal.

321 18.3.8 Upon receipt of an application or notice as provided in ~~this section 18.3~~, the Department shall
322 notify the public and forward a copy of the application or notice to the Governor and the General
323 Assembly, as appropriate. ~~The Department will take no further formal action on notices that are~~
324 ~~not accompanied by the proper application and application fee.~~

325 18.3.8.1 ~~the Department shall publish a determination as to whether an application submitted~~
326 ~~pursuant to paragraph (b) of subsection (2) of this section is substantially complete within~~
327 ~~forty-five days after receipt of the application. Within forty-five (45) days after receipt of an~~
328 ~~application, the Department shall publish a determination as to whether the application~~
329 ~~submitted is substantially complete.~~

330 18.3.8.2 ~~an initial public meeting or hearing shall be convened within forty-five days after~~
331 ~~publication of the determination that the application is substantially complete. A second~~
332 ~~such public meeting shall be convened within thirty days after the first public meeting.~~
333 ~~Within forty-five (45) days after publication its determination that the application required~~
334 ~~by 18.3.8.1 is substantially complete, an initial public meeting shall be convened. The~~
335 ~~meeting shall, at a minimum require:~~

336 ~~(1) At least two weeks' written notice before the meeting;~~

337 ~~(2) The meeting to be hosted and presided over by a person selected upon agreement by~~
338 ~~the Department, the local Board of County Commissioners and the applicant;~~

339 ~~(3) The licensee or applicant to provide a summary of the facility's application to receive,~~
340 ~~store, process, or dispose of material and the nature of the material;~~

341 ~~(4) An opportunity for the public to comment and be heard;~~

342 ~~(5) The licensee or applicant to provide transcripts of the meeting, which:~~

343 ~~(a) Allows the public to make copies of a transcript of the meeting; and~~

344 ~~(b) Shall be provided to the Department in an electronic format in a manner that~~
345 ~~allows posting on the Department's website within ten (10) days after receipt~~
346 ~~from the transcription service.~~

347 18.3.8.3 ~~the Department shall approve, approve with conditions, or deny the application within~~
348 ~~three hundred sixty days after the second public meeting.~~

Comment [JJ19]: Paragraph added consistent with the 2015 changes to the RCA. The provision allows for a facility to receive non-processing related radioactive materials provided the license authorizes the material and activity.
RCA: 25-11-203(1)(b)(I)

Comment [JJ20]: Wording change consistent with 2015 statutory (RCA) changes via House Bill 15-1145.
C.R.S. 25-11(1)(b)(II)

Comment [JJ21]: Editorial adjustment - number is added for clarity/consistency with other formatting in Part 18.

Comment [JJ22]: Wording change to "radioactive" consistent with 2015 statutory (RCA) changes via House Bill 15-1145.

Comment [JJ23]: Throughout section 18.3.8 and subsections, language is reworded with the intent of improving the clarity, understanding and flow of the rule.

Comment [JJ24]: The original language of 18.3.8.1 (shown in strikethrough) makes reference to "paragraph (b) of subsection (2)". Paragraph (b) of subsection (2) does not currently exist within Part 18. During a prior revision to Part 18, this reference was incorporated in Part 18 in error. The "paragraph (b)" phrase refers to a section in the Colorado Radiation Control Act (2010) (rather than Part 18).

Comment [JJ25]: This paragraph incorporates the requirements of 18.3.9.1 relating to the application being substantially complete prior to holding an initial meeting.

Comment [JJ26]: Relocated from 18.3.9.1(1).

Comment [JJ27]: Relocated from 18.3.9.1.

Comment [JJ28]: Relocated from 18.3.9.1(2).

Comment [JJ29]: Relocated from 18.3.9.1(2).

Comment [JJ30]: Relocated from 18.3.9.1(3).

Comment [JJ31]: This paragraph is removed/deleted as it is replaced by 18.3.8.4.

349 18.3.8.3 Within ninety (90) days of the initial public meeting required by 18.3.8.2, a response, if
350 any, written by the local Board of County Commissioners to the applicant's environmental
351 assessment is to be provided to the applicant.

Comment [JJ32]: The requirements of 18.3.9.3 have been incorporated here.

352 Upon request of and documentation of the expenditure by such Board, the applicant shall
353 provide the Board with up to fifty thousand dollars, as adjusted for inflation since 2003,
354 which is available to assist the Board in responding to the application, including an
355 independent environmental analysis and identification of any substantial adverse impact
356 upon the safety or maintenance of transportation infrastructure or transportation facilities
357 within the county.

Comment [JJ33]: The phrase "as adjusted for inflation..." is included, consistent with the 2014 RCA changes.
Senate Bill 14-192

358 18.3.8.4 Upon completion of the Department's review of the application, the Department shall
359 provide notice to the public of issuance of an initial draft decision where the license
360 application is approved, approved with conditions, or is denied.

Comment [JJ34]: Language is added consistent with the 2014 RCA changes
NOTE: The 360 day time period specified in the current rule (in 18.3.8.3) is deleted, consistent with the 2014 RCA changes (via SB 14-192).
RCA: 25-11-203 (3)(c)(V)(C).
Senate Bill (SB) 14-192

361 (1) The initial draft decision shall be posted on the Department's website at the time of
362 notice and shall include:

- 363 (a) A decision analysis;
- 364 (b) The final technical and environmental impact analysis conducted by the
365 Department as specified in 18.4;
- 366 (c) All requests from the Department seeking information from the applicant and
367 all of the applicant's responses;
- 368 (d) All public comments;
- 369 (e) Any additional information that may assist the public review of the
370 Department's draft decision; and
- 371 (f) A draft license for any proposed approval.

372 (2) Upon issuance of the initial draft decision in 18.3.8.4, the Department shall initiate a
373 final public comment process which shall include:

- 374 (a) A public comment period that shall be noticed at the time the initial draft
375 decision is published; and
- 376 (b) A public meeting, held within thirty (30) days after giving public notice of the
377 initial draft decision. Such meeting shall, at a minimum require:
- 378 (i) At least two weeks' written notice before the meeting;
- 379 (ii) The meeting to be hosted and presided over by a person selected
380 upon agreement by the Department, the local Board of County
381 Commissioners and the applicant;
- 382 (iii) The summary of the facilities' license to receive, store, process, or
383 dispose of radioactive material and the nature of the radioactive
384 material;
- 385 (iv) The opportunity for cross-examination;

Comment [JJ35]: The requirement for a public meeting to be held within 30 days of providing notice of the initial draft decision, is specified by the RCA.

- 386 (v) An opportunity for the public to comment and be heard;
- 387 (vi) The licensee or applicant to provide transcripts of the meeting,
388 which:

Comment [JJ36]: The opportunity for cross-examination was requested by NRC in correspondence dated January 14, 2014 and is necessary for compatibility with federal rule in 10 CFR 150.31.
NRC Compatibility = C

389 (a) Allows the public access to make copies of a transcript of the
390 meeting; and

391 (b) Shall be provided to the Department in an electronic format in a
392 manner that allows posting on the Department's website within
393 ten (10) days after receipt from the transcription service.

394 (3) For applications which are denied, the Department shall issue a decision document
395 summarizing the basis for denial.

396 18.3.8.5 The expense of public notice, public comment periods, or public meetings required by
397 Section 18.3 shall be at the expense of the applicant or licensee.

398 18.3.8.6 Following the public comment period specified in 18.3.8.4(2), the Department shall:

399 (1) After review of all final public comments, issue a final draft decision; and

400 (2) Provide affected parties, including the applicant in the case of approval with
401 conditions or denial, an opportunity to request an adjudicatory hearing in accordance with
402 24-4-105, C.R.S.

403 18.3.8.7 If none of the parties specified in 18.3.8.6(2) seeks an adjudicatory hearing, the final
404 draft decision becomes final agency action.

Comment [JJ37]: Provisions 18.3.8.7, 18.3.8.8, 18.3.8.9 and 18.3.8.10 originate from RCA provision (3)(c)(I)(V)(D)

405 18.3.8.8 If any party specified in 18.3.8.6(2) seeks an adjudicatory hearing, resolution of all
406 material issues of fact, law, or discretion presented by the record and the appropriate
407 order, sanction, relief, or denial of the material issues must be through an initial decision
408 of a hearing officer or administrative law judge.

409 18.3.8.9 Upon issuance of the initial decision of the hearing officer or administrative law judge,
410 and after any allowable appeal to the executive director of the Department, the
411 Department shall issue within a reasonable time a final decision to approve, approve with
412 conditions, or deny the application.

413 18.3.8.10 The final decision in 18.3.8.9 is subject to judicial review pursuant to section 24-4-106,
414 C.R.S.

415 18.3.8.11 The applicant shall pay all reasonable, necessary, and documented expenses of the
416 hearing held in accordance with 18.3.8.8.

417 18.3.9 In addition to the requirements of section 18.3 and 18.4, each new, renewal or amendment
418 application pertaining to the facility's receipt of classified material shall include a written
419 application to the Department and information relevant to the pending application, including:

Comment [JJ38]: Applicable elements of this requirement exist in the "preamble" language to 18.3, and in 18.3.5.4

420 18.3.9.1 transcripts of two public meetings hosted and presided over by a person selected upon
421 agreement by the Department, the local Board of County Commissioners, and the
422 applicant. One or both of the meetings shall be a hearing conducted to comply with
423 section 24-4-104 or 24-4-105, CRS. The expense of the meetings or hearing shall be
424 paid by the facility. Such meetings shall not be held until the Department determines that
425 the application is substantially complete. The facility shall provide the public with:

Comment [JJ39]: The requirements of this section have been incorporated into 18.3.8.2 and 18.3.8.4

426 (1) at least two weeks' written notice before the first meeting and an additional two
427 weeks' written notice before the second meeting;

Comment [JJ40]: The requirement relating to expenses have been incorporated into 18.3.8.5, 18.3.8.11

428 (2) At both meetings, summaries of the facility's license to receive, store, process, or
429 dispose of classified material and the nature of the classified material, and an
430 opportunity to be heard; and

Comment [JJ41]: The requirement of this section has been incorporated into 18.3.8.2, and 18.3.8.4

Comment [JJ42]: The requirements of this section have been relocated to 18.3.8.2(3), and 18.3.8.4(2)(b)

431 ~~(3) access to make copies of a transcript of the meetings, and shall provide an~~
432 ~~electronic copy to the Department in a manner that allows posting on the~~
433 ~~department's web site within ten days after receipt from the transcription service.~~

Comment [JJ43]: The requirements of this section have been relocated to 18.3.8.2(5), 18.3.8.4(2)(b)

434 ~~18.3.9.2 an environmental assessment as defined in 18.3.5;~~

Comment [JJ44]: The requirements of this section have been relocated to (new) Section 18.3.5.2

435 ~~18.3.9.3 a response, if any, to the environmental assessment written by the Board of County~~
436 ~~Commissioners provided to the facility within ninety days after the first public meeting.~~
437 ~~Upon request of and documentation of the expenditure by such Board, the applicant shall~~
438 ~~provide the Board with up to fifty thousand dollars, which shall be available to assist the~~
439 ~~Board in responding to the application, including an independent environmental analysis~~
440 ~~and identification of any substantial adverse impact upon the safety or maintenance of~~
441 ~~transportation infrastructure or transportation facilities within the county.~~

Comment [JJ45]: The requirements of this section have been relocated to (new) Section 18.3.8.3

442 **18.4 Department Environmental Impact Analysis**

Comment [JJ46]: The word "Department" added for clarity.

443 ~~18.4.1 The Department shall prepare a written Environmental Impact Analysis (EIA) of the impact of the~~
444 ~~licensed activity on the environment. For each license application or application to amend or~~
445 ~~renew an existing license to receive, possess, or use source material for uranium or thorium~~
446 ~~milling or byproduct material as in definition (2) of 1.2.2 which will have a significant impact on the~~
447 ~~environment, the Department shall prepare a written analysis of the impact of the licensed~~
448 ~~activity on the environment, which The written EIA shall be made available for review by the~~
449 ~~public and for review by the NRC at the time of public notice in 18.3.8.5 of hearing. The EIA~~
450 ~~which analysis shall include:~~

Comment [JJ47]: The wording of this section is modified for clarity and understanding.

451 18.4.1.1 An assessment of the radiological and nonradiological impacts to the public health;

452 18.4.1.2 An assessment of any impact on any waterway and ground water;

453 18.4.1.3 Consideration of alternatives to the activities to be conducted; and

454 18.4.1.4 Consideration of the long-term impacts of the licensed activities.

455 18.4.2 In preparing the ~~EIA~~ environmental impact analysis, the Department may use and incorporate by
456 reference the environmental ~~report~~ assessment prepared by the applicant and environmental
457 ~~assessments~~ analysis prepared by Federal, State or local agencies.

458 18.4.3 The ~~EIA~~ environmental impact analysis, or any part thereof, shall be prepared directly by the
459 Department or the Department shall utilize the third party method set forth in 3.13.

460 **18.5 Notices Requirements Pertaining to Materials Not Subject to 18.3 and 18.4 and Financial**
461 **Assurance**

462 ~~18.5.1 At least ninety (90) days before a facility proposes to receive, store, process, or dispose of~~
463 ~~classified-radioactive material in a license application or amendment that is not subject to 18.3~~
464 ~~and 18.4, and for which a material acceptance report has not already been filed with the~~
465 ~~Department, the facility shall notify the Department in writing, and the Department shall notify the~~
466 ~~public and the board of county commissioners of the county in which the facility is located, of the~~
467 ~~specific classified-radioactive material to be received, stored, processed, or disposed of. The~~
468 ~~notice shall must include:~~

Comment [JJ48]: The requirements of this provision originate from RCA requirements in 25-11-203(4)(a) and updated in 2015.

The phrase "in writing" is added for clarity.

469 18.5.1.1 ~~A~~ representative analysis of the physical, chemical, and radiological properties of the
470 ~~classified-radioactive~~ material;

471 18.5.1.2 ~~T~~he material acceptance report that demonstrates that the ~~classified-radioactive~~
472 material does not contain hazardous waste characteristics not found in uranium ore;

473 18.5.1.3 ~~A~~ detailed plan for transport, acceptance, storage, handling, processing, and disposal
474 of the material;

475 18.5.1.4 ~~Aa~~ demonstration that the material contains technically and economically recoverable
476 uranium, without taking into account its value as disposal material;

477 18.5.1.5 ~~T~~the existing location of the ~~classified-radioactive~~ material;

478 18.5.1.6 ~~T~~the history of the ~~classified-radioactive~~ material;

479 18.5.1.7 ~~Aa~~ written statement by the applicant describing any pre-existing regulatory
480 classification of the ~~classified-wasteradioactive material~~ in the state of origin that
481 describes all steps taken by the applicant to identify ~~such-the~~ classification;

482 18.5.1.8 ~~Aa~~ written statement from the United States Department of Energy or successor agency
483 that the receipt, storage, processing, or disposal of the ~~classified-radioactive~~ material at
484 the facility will not adversely affect the Department of Energy's receipt of title to the facility
485 pursuant to the federal "Atomic Energy Act of 1954", 42 U.S.C. Sec. 2113;

486 18.5.1.9 ~~Dd~~documentation showing any necessary approvals of the ~~uUnited sS~~ates
487 ~~eE~~nvironmental ~~pP~~rotection ~~aA~~gency; and

488 ~~18.5.1.10~~ ~~Aa~~n environmental assessment ~~containing the information required by 18.3.5.4as~~
489 ~~defined in section 18.4 and 18.5 of this section, and~~ which may incorporate by reference
490 relevant information contained in an environmental assessment previously submitted for
491 the facility.

Comment [JJ49]: The specific reference to the contents of the environmental assessment are referenced for clarity.

492 18.5.2 Within thirty ~~(30)~~ days after the department's receipt of notice pursuant to 18.5.1, the Department
493 shall determine whether the notice is complete.

494 ~~18.5.3~~ ~~O~~nce the department determines that the notice pursuant to 18.5.1 is complete, the Department
495 shall:

Comment [JJ50]: Sub-section 18.5.3 is revised to incorporate language similar to that found in 18.5.1. This provision is intended to improve the clarity and flow of this subsection.

496 ~~18.5.3.1~~ ~~P~~ublish the notice of the specific material to be received, stored, processed, or disposed
497 ~~of, to:~~

Comment [JJ51]: Section added consistent with the 2014 RCA changes.
25-11-203(4)(a)(II)(c)

498 ~~(1) The public, through publishing on the Department's web site; and~~

499 ~~(2) The county commissioners of the county in which the facility is located.~~

500 ~~publish the notice on its web site and~~

501 ~~18.5.3.2~~ ~~The notice required in 18.5.3.1 shall include the information contained in 18.5.1.1~~
502 ~~through 18.5.1.10.~~

503 ~~18.5.3.3~~ ~~p~~Provide a sixty ~~(60)~~-day public comment period for the receipt of written comments
504 concerning the notice. ~~Aa~~-public hearing may be held, at the Department's discretion, at the
505 operator's expense.

506 18.5.4 ~~W~~within thirty ~~(30)~~ days after the close of the written public comment period held pursuant to
507 18.5.3, the Department shall approve, approve with conditions, or deny the receipt, storage,
508 processing, or disposal as described in the notice based on whether the material proposed for
509 receipt, storage, processing, or disposal complies with the facility's license and:

510 18.5.4.1 Be conducted such that the exposures to workers and the public are within the dose
511 limits of part 4 of the department's rules pertaining to radiation control for workers and the
512 public;

513 18.5.4.2 Not cause releases to the air, ground, or surface or ground water that exceed permitted
514 limits; and

515 18.5.4.3 Not prevent transfer of the facility to the United States in accordance with 42 U.S.C. sec.
516 2113 upon completion of decontamination, decommissioning, and reclamation of the
517 facility.

518 **18.6 Financial Assurance**

Comment [JJ52]:
The previous section (18.5) is divided into two sections (18.5, and 18.6) to enhance functionality and flow.

519 ~~18.6.15.5~~ Prior to issuance of the license, the applicant shall:

520 ~~18.6.1.1(4)~~ Establish financial assurance arrangements, as provided by 3.9.5, to ensure
521 decontamination and decommissioning of the facility; and

522 ~~18.6.1.2(2)~~ Provide a fund adequate to cover the payment of the cost for long-term care and
523 monitoring as provided by 3.9.5. ~~4015~~.

524 (1) Such fund shall be sufficient to meet the requirements of 3.9.5. ~~4015~~.4.

525 (2) The Department will consider proposals to combine the two types of financial
526 assurance.

527 (3) Financial assurance shall be provided prior to commencement of construction or
528 operation.

529 **18.6.2 Financial surety arrangements must be established by each mill operator before the**
530 **commencement of operations to assure that sufficient funds will be available to carry out**
531 **the decontamination and decommissioning of the mill and site and for the reclamation of**
532 **any tailings or waste disposal areas. The amount of funds to be ensured by such surety**
533 **arrangements must be based on Department-approved cost estimates in a Department-**
534 **approved plan, or a proposed revision to the plan submitted to the Department for**
535 **approval, if the proposed revision contains a higher cost estimate for:**

Comment [JJ53]: As requested by NRC, this provision is added for compatibility with 10 CFR Part 40, Appendix A, Criterion 9(a)(1), and (2).
<http://www.nrc.gov/reading-rm/doc-collections/cfr/part040/part040-appa.html>
Compatibility = C
NRC RATS = 2011-1
NRC Letter 11/19/14

536 **18.6.2.1 Decontamination and decommissioning of mill buildings and the milling site to**
537 **levels which allow unrestricted use of these areas upon decommissioning, and**

538 **18.6.2.2 The reclamation of tailings and/or waste areas in accordance with technical**
539 **criteria delineated in Criterion 1 through 8 of Appendix A.**

540 **18.6.3 To avoid unnecessary duplication and expense, the Department may accept financial sureties**
541 **that have been consolidated with financial or surety arrangements established to meet**
542 **requirements of other Federal or state agencies and/or local governing bodies for**
543 **decommissioning, decontamination, reclamation, and long-term site surveillance and control,**
544 **provided such arrangements are considered adequate to satisfy these requirements and that the**
545 **portion of the surety which covers the decommissioning and reclamation of the mill, mill tailings**
546 **site and associated areas, and the long-term funding charge is clearly identified and committed**
547 **for use in accomplishing these activities.**

Comment [JJ54]: As requested by NRC, this provision added for compatibility with 10 CFR Part 40, Appendix A, Criterion 9(d).
NRC Compatibility = C
NRC Letter 11/19/14

548 **18.67 License Hearings**

Comment [JJ55]:
Additional language is added to address possible conflicts between the specific hearing provisions in 18.7 and the hearing procedures of other hearing forums (such as an administrative court) where specific procedures may exist. The proposed language defers to the hearing procedures outside of Part 18 for the hearing process where such conflicts may arise.
Section 18.6 is renumbered to 18.7 due to the addition of prior renumbering.

549 18.67.1 There shall be an opportunity for public hearings to be held in accordance with the procedures in
550 24-4-104 and 24-4-105, CRS., and 18.67, prior to the granting, denial or renewal of a specific
551 license permitting the receipt, possession or use of source material for milling or byproduct
552 material as defined in this part in definition (2) of 1.2.2, provided, however, in the event of a
553 conflict between the provisions of 18.7 and the hearing provisions of any applicable administrative
554 hearing forum, including the Office of Administrative Courts, the latter shall apply.

555 18.67.2 Notice of Hearing

556 18.67.2.1 All hearings shall be preceded by written notice containing:

557 18.67.2.1.1 The nature of the hearing and its time and place;

- 558 | 18.67.2.1.2 The legal authority and jurisdiction under which the hearing is to be held;
- 559 | 18.67.2.1.3 The matters of fact and law asserted or to be considered;
- 560 | 18.67.2.1.4 A description of the proposed licensing action and a statement of the
561 | availability of its text from the Department;
- 562 | 18.67.2.1.5 A description of the right of any interested person to make written
563 | comments to the Department or present oral comments at the hearing;
- 564 | 18.67.2.1.6 The procedure for applying to become a party to the hearing; and
- 565 | 18.67.2.1.7 A description of the procedures to be followed at the hearing and at a
566 | prehearing conference if required.
- 567 | 18.67.2.2 The notice of the hearing shall be mailed by the Department to the licensee or
568 | applicant and to each person who has filed a written request to receive notice of such
569 | proceedings. The licensee or applicant shall cause the notice to be published for three (3)
570 | days in a newspaper of statewide circulation and in local newspapers designated by the
571 | Department in the area to be affected by the proposed action. The notice shall be mailed
572 | and published not less than ninety (90) days prior to the hearing.
- 573 | 18.67.2.3 The time and place of hearing will be fixed with due regard for the convenience of
574 | the parties or their representatives, and the public interest. The hearing will be held in the
575 | locale of the site to be licensed.
- 576 | 18.67.2.4 The cost of any licensing action hearing shall be at the expense of the applicant.
577 | These costs shall include, but not be limited to, the hearing officer, the meeting room, the
578 | court reporter and transcript copies, and the required notices. The costs shall not include
579 | the expenses of other parties to the hearing.
- 580 | 18.67.3 Party Status
- 581 | 18.67.3.1 A person who may be affected or aggrieved by Department action may apply for
582 | party status not less than twenty (20) days prior to the hearing. Thereafter, application to
583 | be made a party shall not be considered except upon motion for good cause shown.
- 584 | 18.67.3.2 Application for party status must identify the individual or group applying,
585 | including the address or phone number where they may be contacted, state the nature of
586 | their interest in the hearing and the specific ground on which they claim to be affected or
587 | aggrieved, and the specific aspects of the hearing which they wish to address.
- 588 | 18.67.3.3 The Department, or the hearing officer, will grant or deny party status within five
589 | (5) days after receipt of the request for party status based on the nature and extent of the
590 | person's property, financial or other interest in the hearing and the possible effect of any
591 | order which may be entered as a result of the hearing on the person's interest. Any
592 | person applying for or granted party status may, by motion to the hearing officer or
593 | Department, as appropriate, challenge the right of any other person to be a party.
- 594 | 18.67.3.4 Parties shall have the right to initiate discovery. Parties shall have the right to
595 | make motions or objections, present evidence, cross-examine witnesses, and appeal
596 | from the decision of the hearing as provided by the Colorado Administrative Procedures
597 | Act, 24-4-101 et seq., CRS.
- 598 | 18.67.3.5 A person who is not a party will be permitted to submit written comments to the
599 | Department and may be permitted to make an oral presentation at the hearing, but will
600 | not have the other rights of a party.
- 601 | 18.67.4 Prehearing Conference

- 602 | 18.67.4.1 The Department or hearing officer, on its own motion or at the request of any
603 | party or any person who has applied to become a party, may direct the parties to appear
604 | at a specific time and place for a conference to consider:
- 605 | 18.67.4.1.1 The simplification and clarification of the issues;
- 606 | 18.67.4.1.2 The obtaining of stipulations and admissions of fact and of the contents
607 | and authenticity of documents to avoid unnecessary proof;
- 608 | 18.67.4.1.3 Identification of witnesses and the limitation of the number of expert
609 | witnesses, and other steps to expedite the presentation of evidence;
- 610 | 18.67.4.1.4 The setting of a hearing schedule;
- 611 | 18.67.4.1.5 Granting or denying requests for party status, if such decisions have not
612 | previously been made;
- 613 | 18.67.4.1.6 Such other matters as may aid in the orderly disposition of the hearing.
- 614 | 18.67.4.2 At such conference each party or person who has applied to become a party
615 | shall present to every other person, party, and the Department a prehearing statement
616 | containing the following:
- 617 | 18.67.4.2.1 A brief summary of the nature of the claim of the party and the basis
618 | therefore;
- 619 | 18.67.4.2.2 A copy of all exhibits proposed to be introduced; and
- 620 | 18.67.4.2.3 A list of all witnesses who may be called and a brief description of their
621 | testimony.
- 622 | 18.67.4.3 Except for good cause shown or for evidence or testimony accepted as rebuttal,
623 | no witness may testify nor may any exhibits be introduced on behalf of a party who had
624 | notice of the prehearing conference unless such witness has been previously listed
625 | and/or his written testimony and related exhibits have been presented to opposing parties
626 | at the prehearing conference.
- 627 | 18.67.4.4 The Department or hearing officer shall issue a written summary of the action
628 | taken at the conference and agreements by the parties, which limits the issues or defines
629 | the matters in controversy to be determined in the hearing.
- 630 | 18.67.5 Discovery
- 631 | 18.67.5.1 Any party may initiate discovery in the form of interrogatories to another party,
632 | requests for admission to another party, requests for production of documents to another
633 | party, or depositions of any persons, or any combination thereof. The Colorado Rules of
634 | Civil Procedure, to the extent not inconsistent with the Colorado Administrative Procedure
635 | Act, shall apply. Such discovery may be modified by a motion for protective order filed
636 | with the Department or hearing officer within seven (7) days of receipt of the notice or
637 | request for discovery. Motions for protective order shall set forth the grounds in support
638 | thereof and shall be ruled upon immediately. Discovery shall be completed no later than
639 | ten (10) days preceding the hearing date, except as otherwise ordered by the
640 | Department or hearing officer.
- 641 | 18.67.6 Conduct of Hearings
- 642 | 18.67.6.1 Hearing presentations will proceed in the following order unless otherwise
643 | directed by the Department or hearing officer.

- 644 | 18.67.6.1.1 Call to order, introductory remarks, and action on applications for party
645 | status, if not already decided.
- 646 | 18.67.6.1.2 Presentation of any stipulations or agreements of the parties, and any
647 | other matters which were required to be dealt with at the prehearing conference,
648 | if held.
- 649 | 18.67.6.1.3 Opening statement by the party upon whom the burden of proof rests.
- 650 | 18.67.6.1.4 Opening statements by all other parties.
- 651 | 18.67.6.1.5 Presentation of case by party upon whom burden of proof rests.
- 652 | 18.67.6.1.6 Presentation by all other persons wishing to offer evidence in the order to
653 | be determined by the Department or hearing officer.
- 654 | 18.67.6.1.7 Rebuttal by the party upon whom the burden of proof rests, followed by
655 | rebuttal of other parties.
- 656 | 18.67.6.1.8 Closing statements by party upon whom the burden of proof rests,
657 | followed by closing statements of all other parties.
- 658 | 18.67.6.2 Public participation as provided for in these rules shall be allowed at that time or
659 | times during the hearing as determined by the Department or hearing officer in their
660 | discretion to be appropriate.
- 661 | 18.67.6.3 At the conclusion of any witness's testimony, or at the conclusion of the party's
662 | entire presentation, as may be determined by the Department or hearing officer, all
663 | parties may then cross-examine such witness or witnesses. The Department or hearing
664 | officer may examine and cross-examine any witness. A person who is not a party shall
665 | not have the right to cross-examine.
- 666 | 18.67.6.4 Any person, not a party to the proceeding, wishing to present testimony may do
667 | so by indicating his desire in writing. A form will be available prior to and during the
668 | hearing. This form will request the person's name, address, whom he represents, the
669 | general nature of his testimony, and the time required for his presentation. This form is to
670 | be presented to a representative of the Department during the hearing. Voluntary
671 | testimony not specifically requested on or by the written form may also be allowed. Any
672 | person presenting testimony shall be under oath and be subject to cross examination.
- 673 | 18.67.6.5 The proponent of any motion, order, or license issuance bears the burden of
674 | proof.
- 675 | 18.67.6.6 No interested person, party, or applicant for party status outside the Department
676 | will have any oral or written communication with any Department personnel or hearing
677 | officer relevant to the merits of a hearing pending before the Department unless
678 | reasonable prior notice is given to all participants in the hearing. This prohibition shall
679 | apply after the hearing is noticed. Any Department employee or hearing officer who is
680 | involved in such a prohibited communication shall make a written record of it and transmit
681 | it to all the parties to the hearing.
- 682 | 18.67.7 Department Decision
- 683 | 18.67.7.1 Any party to a hearing may, or if so directed by the Department or the hearing
684 | officer shall, file proposed findings of fact and conclusions of law and a proposed form of
685 | order or decision within twenty (20) days after the record is closed. A party who has the
686 | burden of proof may reply within ten (10) days after service of proposed findings of fact
687 | and conclusions of law.

688 18.67.7.2 After due consideration of the hearing record, the Department or hearing officer
689 shall issue its findings of fact, conclusions of law, and decision and order.

690 **18.78 Operational Requirements.**

691 Each licensee authorized to receive, possess or use source material for milling or byproduct material ~~as in~~
692 ~~definition (2) of 1.2.2~~ shall:

693 18.78.1 Operate in accordance with the requirements of this Part 18, in particular the procedures required
694 by 18.3.2, monitoring required by 18.3.3, and the requirements and objectives of Appendix A to
695 this Part 18.

696 18.78.2 Submit a report to the Department within ~~sixty (60)~~ days after January 1 and July 1 of each year,
697 specifying the quantity of each of the radioactive materials released to unrestricted areas in liquid
698 and in gaseous effluents during the previous six months of operation, and such other information
699 as the Department may require to estimate maximum potential annual radiation doses to the
700 public resulting from effluent releases. If quantities of radioactive materials released during the
701 reporting period are significantly above the licensee's design objectives previously reviewed as
702 part of the licensing action, the report shall cover this specifically. On the basis of such reports
703 and any additional information the Department may obtain from the licensee or others, the
704 Department may from time to time require the licensee to take such action as the Department
705 deems appropriate.
706
707

708 18.78.3 For any licensed site or facility determined by the Department to have caused a release to the
709 groundwater that exceeds the basic standards for groundwater as established by the water
710 quality control commission, until remediation has been completed, the licensee shall provide
711 annual written notice of the status of the release and any remediation activities associated with
712 the release, by certified or registered mail, return receipt requested, to the current address for
713 each registered groundwater well within one mile of the release as identified in the corrective
714 action monitoring program, ~~unless the licensee demonstrates that a distance less than one mile is~~
715 ~~warranted~~. Documentation of this activity will be retained and made available to the Department
716 upon request.

Comment [JJ56]: Phrase removed, consistent with 2014 RCA changes.

717 ~~18.8.3.1 Under no circumstances shall remediation be deemed complete until all groundwater~~
718 ~~wells affected by any release associated with the site or facility are restored to at least~~
719 ~~the numeric groundwater standards as established by the water quality control~~
720 ~~commission that apply to the historic uses of the wells. The licensee shall remediate~~
721 ~~any release affecting groundwater wells in the most expedited manner reasonably~~
722 ~~possible using best available active restoration and groundwater monitoring~~
723 ~~technologies.~~

Comment [JJ57]: This provision is added consistent with the 2014 changes to the Colorado Radiation Control Act.

SENATE BILL 14-192
RCA: 25-11-107(5)(j)

724 ~~18.8.3.2 Prior to the application of any numeric groundwater standard different from the~~
725 ~~baseline standard contained in 10 CFR Part 40, the standard must have been~~
726 ~~approved by the United States Nuclear Regulatory Commission in accordance with~~
727 ~~section 274o of the federal "Atomic Energy Act of 1954", 42 U.S.C. sec 2021(o).~~

Comment [JJ58]: This provision is added consistent with the 2015 changes to the Colorado Radiation Control Act.

HOUSE BILL 15-1145
RCA: 25-11-107(5)(j)

728 ~~18.8.4 For any facility licensed under Part 18, in addition to any reporting requirements provided~~
729 ~~in the license or rules, the license shall provide notice to the Department as soon as~~
730 ~~practicable upon discovery of any spill or release involving toxic or radioactive materials~~
731 ~~and shall provide an initial written report within seven (7) days after any discovery. The~~
732 ~~department shall post all such written reports on the Department's web site as soon as~~
733 ~~practicable, and in no case later than seven (7) days after receipt by the Department.~~

Comment [JJ59]: This provision is added consistent with the 2014 changes to the Colorado Radiation Control Act.

SENATE BILL 14-192
RCA: 25-11-107(5)(k)

734 **18.89 Decommissioning Requirements.**

735 18.89.1 In addition to the information required under 3.16, each licensee authorized to receive, possess
736 or use source material for milling or byproduct material ~~as in definition (2) of 1.2.2~~ shall submit a

- 737 plan for completion of decommissioning if the procedures necessary to carry out
738 decommissioning:
- 739 18.89.1.1 ~~_____~~ Have not been previously approved by the Department; and
- 740 18.89.1.2 ~~_____~~ Could increase potential health and safety impacts to workers or to the public,
741 such as in any of the following cases:
- 742 18.89.1.2.1 ~~_____~~ Procedures would involve techniques not applied routinely during
743 cleanup or maintenance operations; or
- 744 18.89.1.2.2 ~~_____~~ Workers would be entering areas not normally occupied where surface
745 contamination and radiation levels are significantly higher than routinely
746 encountered; or
- 747 18.89.1.2.3 ~~_____~~ Procedures could result in significantly greater airborne concentrations
748 of radioactive materials than are present during operation; or
- 749 18.89.1.2.4 ~~_____~~ Procedures could result in significantly greater releases of radioactive
750 material to the environment than those associated with operation.
- 751 18.89.2 Procedures with potential health and safety impacts may not be carried out prior to approval of the
752 decommissioning plan.
- 753 18.89.3 The proposed decommissioning plan, if required by 18.89.1 or by license condition, must include:
- 754 18.89.3.1 ~~_____~~ Description of planned decommissioning activities;
- 755 18.89.3.2 ~~_____~~ Description of methods used to assure protection of workers and the ~~_____~~ environment
756 against ~~_____~~ radiation hazards during decommissioning;
- 757 18.89.3.3 A description of the planned final radiation survey; and
- 758 18.89.3.4 ~~_____~~ An updated detailed cost estimate for decommissioning, comparison of that
759 estimate with present funds set aside for decommissioning, and plan for assuring the
760 availability of adequate funds for completion of decommissioning.
- 761 18.89.4 The proposed decommissioning plan will be approved by the Department if the information
762 therein demonstrates that the decommissioning will be completed as soon as is reasonable and
763 that the health and safety of workers and the public will be adequately protected.
- 764 18.89.5 Upon approval of the decommissioning plan by the Department, the licensee shall complete
765 decommissioning in accordance with the approved plan. As a final step in decommissioning, the
766 licensee shall submit the information required in 3.16.4.1.5 and shall certify the disposition of
767 accumulated wastes from decommissioning.
- 768 18.89.6 If the information submitted under 3.16.4.1.5 or 18.8 does not adequately demonstrate that the
769 premises are suitable for release for unrestricted use, the Department will inform the licensee of
770 the appropriate further actions required for termination of license.
771

772 **PART 18, APPENDIX A. — CRITERIA RELATING TO THE OPERATION OF MILLS AND THE**
773 **DISPOSITION OF THE TAILINGS OR WASTES FROM THESE OPERATIONS**

774 Introduction: Every applicant for a license to possess and use radioactive material in conjunction with
775 uranium or thorium milling, or byproduct material at sites formerly associated with such milling, is required
776 by the provisions of 18.3 to include in a license application proposed specifications relating to milling
777 operations and the disposition of tailings or wastes resulting from such milling activities. This appendix
778 establishes technical, ownership, and long-term site surveillance criteria relating to the siting, operation,
779 decontamination, decommissioning, and reclamation of mills and tailings or waste systems and sites at
780 which such mills and systems are located.

781 As used in this appendix, the term "as low as is reasonably achievable" has the same meaning as in
782 1.2.2.

783 In many cases, flexibility is provided in the criteria to allow achieving an optimum tailings disposal
784 program on a site-specific basis. However, in such cases the objectives, technical alternatives and
785 concerns which must be taken into account in developing a tailings program are identified. As provided by
786 the provisions of 18.3, applications for licenses must clearly demonstrate how the criteria have been
787 addressed.

788 The specifications shall be developed considering the expected full capacity of tailings or waste systems
789 and the lifetime of mill operations. Where later expansions of systems or operations may be likely (for
790 example, where large quantities of ore now marginally uneconomical may be stockpiled), the amenability
791 of the disposal system to accommodate increased capacities without degradation in long-term stability
792 and other performance factors shall be evaluated.

793 Licensees or applicants may propose to the Department alternatives to meet the specific requirements in
794 this Appendix. The alternative proposals may take into account local or regional conditions, including
795 geology, topography, hydrology, and meteorology. The Department may find that the proposed
796 alternatives meet the Department's requirements if the alternatives will achieve a level of stabilization and
797 containment of the sites concerned and a level of protection for public health, safety, and the environment
798 from radiological and nonradiological hazards associated with the site, which is equivalent to, to the
799 extent practicable, or more stringent than the level which would be achieved by the requirements of this
800 Appendix and the standards promulgated by the Environmental Protection Agency in 40 CFR Part 192,
801 Subparts D and E. Proposed alternatives to specific regulations in this Part 18 require notice and
802 opportunity for hearing before the NRC.

803 All site-specific licensing decisions based on the criteria in this Appendix or alternatives proposed by
804 licensees or applicants will take into account the risk to the public health and safety and the environment
805 with due consideration to the economic costs involved and any other factors the Department determines
806 to be appropriate. In implementing this Appendix, the Department will consider "practicable" and
807 "reasonably achievable" as equivalent terms. Decisions involving these terms will take into account the
808 state of technology, and the economics of improvements in relation to benefits to the public health and
809 safety, and other societal and socioeconomic considerations, and in relation to the utilization of atomic
810 energy in the public interest.

811 **Criterion 1.**

812 Criterion 1A. The general goal or broad objective in sitting-siting and design decisions is permanent
813 isolation of tailings and associated contaminants by minimizing disturbance and dispersion by natural
814 forces, and to do so without ongoing maintenance. For practical reasons, specific sitting-siting decisions
815 and design standards must involve finite times (e.g., the longevity design standard in Criterion 6). The
816 following site features which will contribute to such a goal or objective must be considered in selecting
817 among alternative tailings disposal sites or judging the adequacy of existing tailings sites:

- 818 (1) Remoteness from populated areas;
- 819 (2) Hydrologic and other natural conditions as they contribute to continued immobilization and
820 isolation of contaminants from ground-water sources; and

821 (3) Potential for minimizing erosion, disturbance, and dispersion by natural forces over the long-term.

822 Criterion 1B. The site selection process must be an optimization to the maximum extent reasonably
823 achievable in terms of the features in Criterion 1A.

824 Criterion 1C. In the selection of disposal sites, primary emphasis must be given to isolation of tailings or
825 wastes, a matter having long-term impacts, as opposed to consideration only of short-term convenience
826 or benefits, such as minimization of transportation or land acquisition costs. While isolation of tailings will
827 be a function of both site and engineering design, overriding consideration must be given to ~~siting~~ siting
828 features given the long-term nature of the tailings hazards.

829 Criterion 1D. Tailings should be disposed of in a manner that no active maintenance is required to
830 preserve conditions of the site.

831 **Criterion 2.**

832 To avoid proliferation of small waste disposal sites and thereby reduce perpetual surveillance obligations,
833 byproduct material ~~as in definition (2) of 1-2.2~~, from in situ extraction operations, such as residues from
834 solution evaporation or contaminated control processes, and wastes from small remote above ground
835 extraction operations shall be disposed of at existing large mill tailings disposal sites; unless considering
836 the nature of the wastes, such as their volume and specific activity and the costs and environmental
837 impacts of transporting the wastes to a large disposal site, such offsite disposal is demonstrated to be
838 impracticable or the advantages of onsite burial clearly outweigh the benefits of reducing the perpetual
839 surveillance obligations.

840 **Criterion 3.**

841 The "prime option" for disposal of tailings is placement below grade, either in mines or specially
842 excavated pits (that is, where the need for any specially constructed retention structure is eliminated).
843 The evaluation of alternative sites and disposal methods performed by mill operators in support of their
844 proposed tailings disposal program (provided in applicants' environmental ~~reports~~ assessment) must
845 reflect serious consideration of this disposal mode. In some instances, below grade disposal may not be
846 the most environmentally sound approach, such as might be the case if a ground-water formation is
847 relatively close to the surface or not very well isolated by overlying soils and rock. Also, geologic and
848 topographic conditions might make full below grade burial impracticable: For example, bedrock may be
849 sufficiently near the surface that blasting would be required to excavate a disposal pit at excessive cost,
850 and more suitable alternative sites are not available. Where full below grade burial is not practicable, the
851 size of retention structures, and size and steepness of slopes associated with exposed embankments
852 must be minimized by excavation to the maximum extent reasonably achievable or appropriate given the
853 geologic and hydrologic conditions at a site. In these cases, it must be demonstrated that an above grade
854 disposal program will provide reasonably equivalent isolation of the tailings from natural erosional forces.

855 **Criterion 4.**

856 The following site and design criteria must be adhered to whether tailings or wastes are disposed of
857 above or below grade.

858 Criterion 4A. Upstream rainfall catchment areas must be minimized to decrease erosion potential and the
859 size of the floods, which could erode or wash out sections of the tailings disposal area.

860 Criterion 4B. Topographic features should provide good wind protection.

861 Criterion 4C. Embankment and cover slopes must be relatively flat after final stabilization to minimize
862 erosion potential and to provide conservative factors of safety assuring long-term stability. The broad
863 objective should be to contour final slopes to grades which are as close as possible to those which would
864 be provided if tailings were disposed of below grade: this could, for example, lead to slopes of about 10
865 horizontal to 1 vertical (10h:1v) or less steep. In general, slopes should not be steeper than about 5h:1v.
866 Where steeper slopes are proposed, reasons why a slope less steep than 5h:1v would be impracticable
867 should be provided and compensating factors and conditions, which make such slopes acceptable,
868 should be identified.

869 Criterion 4D. A full self-sustaining vegetative cover must be established or rock cover employed to reduce
870 wind and water erosion to negligible levels.

871 (1) Where a full vegetative cover is not likely to be self-sustaining due to climatic or other conditions,
872 such as in semi-arid and arid regions, rock cover must be employed on slopes of the
873 impoundment system. The Department will consider relaxing this requirement for extremely
874 gentle slopes such as those, which may exist on the top of the pile.

875 (2) The following factors must be considered in establishing the final rock cover design to avoid
876 displacement of rock particles by human and animal traffic or by natural process, and to preclude
877 undercutting and piping:

878 (a) Shape, size, composition, and gradation of rock particles (excepting bedding material
879 average particles size must be at least cobble size or greater);

880 (b) Rock cover thickness and zoning of particles by size; and

881 (c) Steepness of underlying slopes.

882 (3) Individual rock fragments must be dense, sound, and resistant to abrasion, and must be free from
883 cracks, seams, and other defects that would tend to unduly increase their destruction by water
884 and frost actions. Weak, friable, or laminated aggregate may not be used.

885 (4) Rock covering of slopes may be unnecessary where top covers are very thick (on the order of
886 10m or greater); impoundment slopes are very gentle (on the order of 10h:1v or less); bulk cover
887 materials have inherently favorable erosion resistance characteristics; and, there is negligible
888 drainage catchment area upstream of the pile and good wind protection as described in Criteria
889 4A and 4B.

890 (5) Furthermore, all impoundment surfaces must be contoured to avoid areas of concentrated
891 surface runoff or abrupt or sharp changes in slope gradient. In addition to rock cover on slopes,
892 areas toward which surface runoff might be directed must be well protected with substantial rock
893 cover (rip rap). In addition to providing for stability of the impoundment system itself, overall
894 stability, erosion potential, and geomorphology of surrounding terrain must be evaluated to
895 assure that there are not ongoing or potential processes, such as gully erosion, which would lead
896 to impoundment instability.

897 Criterion 4E. The impoundment may not be located near a capable fault that could cause a maximum
898 credible earthquake larger than that which the impoundment could reasonably be expected to withstand.
899 As used in this criterion, the term "capable fault" has the same meaning as defined in section III(g) of
900 Appendix A of 10 CFR Part 100. The term "maximum credible earthquake" means that earthquake which
901 would cause the maximum vibratory ground motion based upon an evaluation of earthquake potential
902 considering the regional and local geology and seismology and specific characteristics of local subsurface
903 material.

904 Criterion 4F. The impoundment, where feasible, should be designed to incorporate features, which will
905 promote deposition. For example, design features, which promote deposition of sediment suspended in
906 any runoff, which flows into the impoundment area, might be utilized; the object of such a design feature
907 would be to enhance the thickness of cover over time.

908 **Criterion 5.**

909 Criteria 5A-5D and Criterion 10 incorporate the basic ground-water protection standards imposed by the
910 Environmental Protection Agency in 40 CFR Part 192, Subparts D and E (48 FR 45926; October 7, 1983)
911 which apply during operations and prior to the end of closure. Groundwater monitoring to comply with
912 these standards is required by Criterion [7A](#).

913 Criterion 5A.

Comment [JJ60]: Cross-reference error
correction – reference should be to Criterion 7 and
not Criterion 7A. Criterion 7A does not exist.

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- 914 (1) The primary ground-water protection standard is a design standard for surface impoundments
915 used to manage byproduct material. Unless exempted under paragraph 5A(3) of this criterion,
916 surface impoundments (except for an existing portion) shall have a liner that is designed,
917 constructed, and installed to prevent any migration of wastes out of the impoundment to the
918 adjacent subsurface soil, ground water, or surface water at any time during the active life
919 (including the closure period) of the impoundment. The liner may be constructed of materials that
920 may allow wastes to migrate into the liner (but not into the adjacent subsurface soil, ground water,
921 or surface water) during the active life of the facility, provided that impoundment closure includes
922 removal or decontamination of all waste residues, contaminated containment system components
923 (liners, etc.) contaminated subsoils, and structures and equipment contaminated with waste and
924 leachate. For impoundments that will be closed with the liner material left in place, the liner must
925 be constructed of materials that can prevent wastes from migrating into the liner during the active
926 life of the facility.
- 927 (2) The liner required by paragraph 5A(1) above shall be:
- 928 (a) Constructed of materials that have appropriate chemical properties and sufficient strength
929 and thickness to prevent failure due to pressure gradients (including static head and
930 external hydrogeologic forces), physical contact with the waste or leachate to which they
931 are exposed, climatic conditions, the stress of installation, and the stress of daily
932 operation;
- 933 (b) Placed upon a foundation or base capable of providing support to the liner and resistance
934 to pressure gradients above and below the liner to prevent failure of the liner due to
935 settlement, compression, or uplift; and
- 936 (c) Installed to cover all surrounding earth likely to be in contact with the wastes or leachate.
- 937 (3) The applicant or licensee will be exempted from the requirements of paragraph 5A(1) of this
938 criterion if the Department finds, based on a demonstration by the applicant or licensee, that
939 alternate design and operating practices, including the closure plan, together with site
940 characteristics will prevent the migration of any hazardous constituents into ground water or
941 surface water at any future time.
- 942 In deciding whether to grant an exemption, the Department will consider:
- 943 (a) The nature and quantity of the wastes;
- 944 (b) The proposed alternate design and operation;
- 945 (c) The hydrogeologic setting of the facility, including the attenuative capacity and thickness
946 of the liners and soils present between the impoundment and ground water or surface
947 water; and
- 948 (d) All other factors which would influence the quality and mobility of the leachate produced
949 and the potential for it to migrate to ground water or surface water.
- 950 (4) A surface impoundment must be designed, constructed, maintained, and operated to prevent
951 overtopping resulting from normal or abnormal operations, overfilling, wind and wave actions,
952 rainfall, or run-on; from malfunctions of level controllers, alarms, and other equipment; and from
953 human error.
- 954 (5) When dikes are used to form the surface impoundment, the dikes must be designed, constructed,
955 and maintained with sufficient structural integrity to prevent massive failure of the dikes. In
956 ensuring structural integrity, it must not be presumed that the liner system will function without
957 leakage during the active life of the impoundment.

958 Criterion 5B.

- 959 (1) Uranium and thorium byproduct material ~~in definition (2) of 1.2.2~~ shall be managed to conform to
 960 the following secondary ground-water protection standard: hazardous constituents entering the
 961 ground water from a licensed site must not exceed the specified concentration limits in the
 962 uppermost aquifer beyond the point of compliance during the compliance period. Hazardous
 963 constituents are those constituents identified by the Department pursuant to paragraph 5B(2) of
 964 this criterion. Specified concentration limits are those limits established by the Department as
 965 indicated in paragraph 5B(5) of this criterion. The Department will also establish the point of
 966 compliance and compliance period on a site-specific basis through license conditions and orders.
 967 The objective in selecting the point of compliance is to provide the earliest practicable warning
 968 that the impoundment is releasing hazardous constituents to the ground water. The point of
 969 compliance must be selected to provide prompt indication of ground-water contamination on the
 970 hydraulically downgradient edge of the disposal area. The Department shall identify hazardous
 971 constituents, establish concentration limits, set the compliance period, and may adjust the point of
 972 compliance if needed to accord with developed data and site information as to the flow of ground
 973 water or contaminants, when the detection monitoring established under Criterion ~~7A~~ indicates
 974 leakage of hazardous constituents from the disposal area.
- 975 (2) A constituent becomes a hazardous constituent subject to paragraph 5B(5) only when the
 976 constituent meets all three of the following tests:
- 977 (a) The constituent is reasonably expected to be in or derived from the uranium and thorium
 978 byproduct material in the disposal area;
- 979 (b) The constituent has been detected in the ground water in the uppermost aquifer; and
- 980 (c) The constituent is listed in Criterion 10 of this appendix.
- 981
- 982 (3) Even when constituents meet all three tests in paragraph 5B(2) of this criterion, the Department
 983 may exclude a detected constituent from the set of hazardous constituents on a site-specific
 984 basis if it finds that the constituent is not capable of posing a substantial present or potential
 985 hazard to human health or the environment. In deciding whether to exclude constituents, the
 986 Department will consider the following:
- 987 (a) Potential adverse effects on ground-water quality, considering
- 988 (i) The physical and chemical characteristics of the waste in the licensed site,
 989 including its potential for migration;
- 990 (ii) The hydrogeological characteristics of the facility and surrounding land;
- 991 (iii) The quantity of ground water and the direction of ground water flow;
- 992 (iv) The proximity and withdrawal rates of ground-water users;
- 993 (v) The current and future uses of ground water in the area;
- 994 (vi) The existing quality of ground water, including other sources of contamination
 995 and their cumulative impact on the ground water quality;
- 996 (vii) The potential for health risks caused by human exposure to waste constituents;
- 997 (viii) The potential damage to wildlife, crops, vegetation, and physical structures
 998 caused by exposure to waste constituents;
- 999 (ix) The persistence and permanence of the potential adverse effects.
- 1000 (b) Potential adverse effects on hydraulically-connected surface water quality, considering

Comment [JJ61]: Cross-reference error correction – reference should be to Criterion 7 and not Criterion 7A. Criterion 7A does not exist.

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- 1001 (i) The volume and physical and chemical characteristics of the waste in the
1002 licensed site;
- 1003 (ii) The hydrogeological characteristics of the facility and surrounding land;
- 1004 (iii) The quantity and quality of ground water and the direction of ground water flow;
- 1005 (iv) The patterns of rainfall in the region;
- 1006 (v) The proximity of the licensed site to surface waters;
- 1007 (vi) The current and future uses of surface waters in the area and any water quality
1008 standards established for those surface waters;
- 1009 (vii) The existing quality of surface water, including other sources of contamination
1010 and the cumulative impact on surface water quality;
- 1011 (viii) The potential for health risks caused by human exposure to waste constituents;
- 1012 (ix) The potential damage to wildlife, crops, vegetation, and physical structures
1013 caused by exposure to waste constituents; and
- 1014 (x) The persistence and permanence of the potential adverse effects.
- 1015 (4) In making any determinations under paragraphs 5B(3) and 5B(6) of this criterion about the use of
1016 ground water in the area around the facility, the Department will consider any identification of
1017 underground sources of drinking water and exempted aquifers made by the Colorado Water
1018 Quality Control Commission, as in 5 CCR 1002-8, or other agency having jurisdiction.
- 1019 (5) At the point of compliance, the concentration of a hazardous constituent must not exceed:
- 1020 (a) The Department-approved background concentration of that constituent in the ground
1021 water;
- 1022 (b) The respective value given in the table in paragraph 5C if the constituent is listed in the
1023 table and if the background level of the constituent is below the value listed; or
- 1024 (c) An alternate concentration limit established by the Department.
- 1025 (6) Conceptually, background concentrations pose no incremental hazards and the drinking water
1026 limits in Criterion 5C state acceptable hazards but these two options may not be practically
1027 achievable at a specific site. Alternate concentration limits that present no significant hazard may
1028 be proposed by licensees for Department consideration. Licensees must provide the basis for any
1029 proposed limits including consideration of practicable corrective actions, that limits are as low as
1030 reasonably achievable, and information on the factors the Department must consider. The
1031 Department will establish a site specific alternate concentration limit for a hazardous constituent
1032 as provided in paragraph 5B(5) of this criterion if it finds that the proposed limit is as low as
1033 reasonably achievable after considering practicable corrective actions, and that the constituent
1034 will not pose a substantial present or potential hazard to human health or the environment as long
1035 as the alternate concentration limit is not exceeded. In making the present and potential hazard
1036 finding, the Department will consider the following factors:
- 1037 (a) Potential adverse effects on ground water quality, considering:
- 1038 (i) The physical and chemical characteristics of the waste in the licensed site
1039 including its potential for migration;
- 1040 (ii) The hydrogeological characteristics of the facility and surrounding land;
- 1041 (iii) The quantity of ground water and the direction of ground water flow;

- 1042 (iv) The proximity and withdrawal rates of ground water users;
- 1043 (v) The current and future uses of ground water in the area;
- 1044 (vi) The existing quality of ground water, including other sources of contamination
1045 and their cumulative impact on the ground water quality;
- 1046 (vii) The potential for health risks caused by human exposure to waste constituents;
- 1047 (viii) The potential damage to wildlife, crops, vegetation, and physical structures
1048 caused by exposure to waste constituents;
- 1049 (ix) The persistence and permanence of the potential adverse effects.
- 1050 (b) Potential adverse effects on hydraulically-connected surface water quality, considering:
- 1051 (i) The volume and physical and chemical characteristics of the waste in the
1052 licensed site;
- 1053 (ii) The hydrogeological characteristics of the facility and surrounding land;
- 1054 (iii) The quantity and quality of ground water, and the direction of ground water flow;
- 1055 (iv) The patterns of rainfall in the region;
- 1056 (v) The proximity of the licensed site to surface waters;
- 1057 (vi) The current and future uses of surface waters in the area and any water quality
1058 standards established for those surface waters;
- 1059 (vii) The existing quality of surface water including other sources of contamination
1060 and the cumulative impact on surface water quality;
- 1061 (viii) The potential for health risks caused by human exposure to waste constituents;
- 1062 (ix) The potential damage to wildlife, crops, vegetations, and physical structures
1063 caused by exposure to waste constituents; and
- 1064 (x) The persistence and permanence of the potential adverse effects.

1065 Criterion 5C.

1066 **Maximum Values for Ground Water Protection**

Constituent or property	Maximum Concentration (Milligrams per liter):
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	0.05
Lead	0.05
Mercury	0.002
Selenium	0.01
Silver	0.05
Endrin (1,2,3,4,10, 10-hexachloro-1,7-epoxy-1,4,4a,5,6,7,8, 9a-octahydro-1, 4-endo, endo-5, 8-dimethano naphthalene)	0.0002
Lindane (1,2,3,4,5,6-hexachloro-cyclohexane, gamma isomer)	0.004
Methoxychlor (1,1,1-Trichloro-2, 2-bis, p-methoxyphenylethane)	0.1
Toxaphene (C 10 H 10 Cl 6 , Technical chlorinated camphene, 67–69 percent chlorine)	0.005

2,4-D (2,4-Dichlorophenoxyacetic acid)	0.1
2,4,5-TP Silvex (2,4,5-Trichloro-phenoxypropionic acid)	0.01

1067

	Becquerels per liter	PicoCuries per liter
Combined radium-226 and radium-228	0.185	5
Gross alpha-particle activity (excluding radon and uranium when producing uranium byproduct material or radon and thorium when producing thorium byproduct material)	0.555	15

1068

1069 Criterion 5D. If the ground water protection standards established under paragraph 5B(1) of this criterion
 1070 are exceeded at a licensed site, a corrective action program must be put into operation as soon as is
 1071 practicable, and in no event later than eighteen (18) months after the Department finds that the standards
 1072 have been exceeded. The licensee shall submit the proposed corrective action program and supporting
 1073 rationale for Department approval prior to putting the program into operation, unless otherwise directed by
 1074 the Department. The objective of the program is to return hazardous constituent concentration levels in
 1075 ground water to the concentration limits set as standards. The licensee's proposed program shall address
 1076 removing the hazardous constituents that have entered the ground water at the point of compliance or
 1077 treating them in place. The program shall also address removing or treating in place any hazardous
 1078 constituents that exceed concentration limits in ground water between the point of compliance and the
 1079 down gradient facility property boundary. The licensee shall continue corrective action measures to the
 1080 extent necessary to achieve and maintain compliance with the ground water protection standard. The
 1081 Department will determine when the licensee may terminate corrective action measures based on data
 1082 from the ground water monitoring program and other information that provide reasonable assurance that
 1083 the ground water protection standard will not be exceeded.

1084 Criterion 5E. In developing and conducting ground water protection programs, applicants and licensees
 1085 shall also consider the following:

1086 (1) Installation of bottom liners (Where synthetic liners are used, a leakage detection system must be
 1087 installed immediately below the liner to ensure major failures are detected if they occur. This is in
 1088 addition to the ground water monitoring program conducted as provided in [Criterion 7.18.3.3](#).
 1089 Where clay liners are proposed or relatively thin, in situ clay soils are to be relied upon for
 1090 seepage control, tests must be conducted with representative tailings solutions and clay materials
 1091 to confirm that no significant deterioration of permeability or stability properties will occur with
 1092 continuous exposure of clay to tailings solutions. Tests must be run for a sufficient period of time
 1093 to reveal any effects if they are going to occur (in some cases deterioration has been observed to
 1094 occur rather rapidly after about nine months of exposure)).

Comment [JJ62]: Cross-reference error correction – reference should be to 18.3.3 and not Criterion 7, consistent with 10 CFR 40 Appendix A, I (Technical Criteria).

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1095 (2) Mill process designs which provide the maximum practicable recycle of solutions and
 1096 conservation of water to reduce the net input of liquid to the tailings impoundment.

1097 (3) Dewatering of tailings by process devices and/or in situ drainage systems (At new sites, tailings
 1098 must be dewatered by a drainage system installed at the bottom of the impoundment to lower the
 1099 phreatic surface and reduce the driving head of seepage, unless tests show tailings are not
 1100 amenable to such a system. Where in situ dewatering is to be conducted, the impoundment
 1101 bottom must be graded to assure that the drains are at a low point. The drains must be protected
 1102 by suitable filter materials to assure that drains remain free running. The drainage system must
 1103 also be adequately sized to assure good drainage).

1104 (4) Neutralization to promote immobilization of hazardous constituents.

1105 Criterion 5E. Where ground water impacts are occurring at an existing site due to seepage, action must
 1106 be taken to alleviate conditions that lead to excessive seepage impacts and restore ground water quality.
 1107 The specific seepage control and ground water protection method, or combination of methods, to be used
 1108 must be worked out on a site-specific basis. Technical specifications must be prepared to control
 1109 installation of seepage control systems. A quality assurance, testing, and inspection program, which
 1110 includes supervision by a qualified engineer or scientist, must be established to assure the specifications
 1111 are met.

1112 Criterion 5G. In support of a tailings disposal system proposal, the applicant/operator shall supply
1113 information concerning the following:

- 1114 (1) The chemical and radioactive characteristics of the waste solutions.
- 1115 (2) The characteristics of the underlying soil and geologic formations particularly as they will control
1116 transport of contaminants and solutions. This includes detailed information concerning extent,
1117 thickness, uniformity, shape, and orientation of underlying strata. Hydraulic gradients and
1118 conductivities of the various formations must be determined. This information must be gathered
1119 from borings and field survey methods taken within the proposed impoundment area and in
1120 surrounding areas where contaminants might migrate to ground water. The information gathered
1121 on boreholes must include both geological and geophysical logs in sufficient number and degree
1122 of sophistication to allow determining significant discontinuities, fractures, and channeled deposits
1123 of high hydraulic conductivity. If field survey methods are used, they should be in addition to and
1124 calibrated with borehole logging. Hydrologic parameters such as permeability may not be
1125 determined on the basis of laboratory analysis of samples alone; a sufficient amount of field
1126 testing (e.g., pump tests) must be conducted to assure actual field properties are adequately
1127 understood. Testing must be conducted to allow estimating chemi-sorption attenuation properties
1128 of underlying soil and rock.
- 1129 (3) Location, extent, quality, capacity and current uses of any ground water at and near the site.

1130 Criterion 5H. Steps must be taken during stockpiling of ore to minimize penetration of radionuclides into
1131 underlying soils; suitable methods include lining and/or compaction of ore storage areas.

1132 **Criterion 6.**

- 1133 (1) In disposing of waste byproduct material, licensees shall place an earthen cover (or approved
1134 alternative) over tailings or wastes at the end of milling operations and shall close the waste
1135 disposal area in accordance with a design¹ which provides reasonable assurance of control of
1136 radiological hazards to (i) be effective for 1,000 years, to the extent reasonably achievable, and,
1137 in any case, for at least 200 years, and (ii) limit releases of radon-222 from uranium byproduct
1138 materials, and radon-220 from thorium byproduct materials, to the atmosphere so as not to
1139 exceed an average² release rate of 0.74 Becquerel per square meter per second (Bq/m² s), or 20
1140 picocuries per square meter per second (pCi/m² s), to the extent practicable throughout the
1141 effective design life determined pursuant to (1)(i) of this criterion. In computing required tailings
1142 cover thicknesses, moisture in soils in excess of amounts found normally in similar soils in similar
1143 circumstances may not be considered. Direct gamma exposure from the tailings or wastes should
1144 be reduced to background levels. The effects of any thin synthetic layer may not be taken into
1145 account in determining the calculated radon exhalation level. If non-soil materials are proposed
1146 as cover materials, it must be demonstrated that these materials will not crack or degrade by
1147 differential settlement, weathering, or other mechanism, over long-term intervals.

1148 ¹ In the case of thorium byproduct materials, the standard applies only to design. Monitoring for radon emissions from thorium
1149 byproduct materials after installation of an appropriately designed cover is not required.

1150 ² This average applies to the entire surface of each disposal area over a period of a least one year, but a period short compared to
1151 100 years. Radon will come from both byproduct materials and from covering materials. Radon emissions from covering materials
1152 should be estimated as part of developing a closure plan for each site. The standard, however, applies only to the emissions from
1153 byproduct materials to the atmosphere.

- 1154 (2) As soon as reasonably achievable after emplacement of the final cover to limit releases of radon-
1155 222 from uranium byproduct material and prior to placement of erosion protection barriers or
1156 other features necessary for long-term control of the tailings, the licensee shall verify through
1157 appropriate testing and analysis that the design and construction of the final radon barrier is
1158 effective in limiting releases of radon-222 to a level not exceeding 0.74 Bq/m² s (20 pCi/m² s)
1159 averaged over the entire pile or impoundment using the procedures described in 40 CFR Part 61,
1160 Appendix B, Method 115, or another method of verification approved by the Department as being
1161 at least as effective in demonstrating the effectiveness of the final radon barrier.
1162 |

- 1163 (3) When phased emplacement of the final radon barrier is included in the applicable reclamation
1164 plan, the verification of radon-222 release rates required in paragraph (2) of this Criterion must be
1165 conducted for each portion of the pile or impoundment as the final radon barrier for that portion is
1166 emplaced.
- 1167 (4) Within ninety days of the completion of all testing and analysis relevant to the required verification
1168 in paragraphs (2) and (3) of this Criterion, the uranium mill licensee shall report to the Department
1169 the results detailing the actions taken to verify that levels of release of radon-222 do not exceed
1170 0.74 Bq/m² s (20 pCi/m² s) when averaged over the entire pile or impoundment. The licensee
1171 shall maintain records until termination of the license documenting the source of input parameters
1172 including the results of all measurements on which they are based, the calculations and/or
1173 analytical methods used to derive values for input parameters, and the procedure used to
1174 determine compliance. These records shall be kept in a form suitable for transfer to the custodial
1175 agency at the time of transfer of the site to the U.S. Department of Energy or State for long-term
1176 care if requested.
- 1177 (5) Near surface cover materials, i.e., within the top three meters (10 feet), may not include waste or
1178 rock that contains elevated levels of radium; soils used for near surface cover must be essentially
1179 the same, as far as radioactivity is concerned, as that of surrounding surface soils. This is to
1180 ensure that surface radon exhalation is not significantly above background because of the cover
1181 material itself.
- 1182 (6) The design requirements in this Criterion for longevity and control of radon releases apply to any
1183 portion of a licensed and/or disposal site unless such portion contains a concentration of radium
1184 in land, averaged over areas of 100 square meters, which as a result of byproduct material, does
1185 not exceed the background level by more than: (i) 0.18 Becquerels (5 picocuries) per gram of
1186 radium-226, or, in the case of thorium byproduct material, radium-228, averaged over the first 15
1187 centimeters (cm) below the surface, and (ii) 0.56 Becquerels (15 pCi) of radium-226, or, in the
1188 case of thorium byproduct material, radium-228, averaged over 15-cm thick layers more than 15
1189 cm below the surface.
- 1190 Byproduct material containing concentrations of radionuclides other than radium in soil, and surface
1191 activity on remaining structures, must not result in a total effective dose equivalent (TEDE) exceeding the
1192 dose from cleanup of radium contaminated soil to the above standard (benchmark dose), and must be at
1193 levels which are as low as reasonably achievable. If more than one residual radionuclide is present in the
1194 same 100 square-meter area, the sum of the ratios for each radionuclide of concentration present to the
1195 concentration limit will not exceed "1" (unity). A calculation of the potential peak annual TEDE within 1000
1196 years to the average member of the critical group that would result from applying the radium standard
1197 (not including radon) on the site must be submitted for approval. The use of decommissioning plans with
1198 benchmark doses which exceed 1 millisievert per year (100 mrem/year), before application of ALARA,
1199 requires the approval of the Department. This requirement for dose criteria does not apply to sites that
1200 have decommissioning plans for soil and structures approved before the effective date of this Criterion
1201 6(6).
- 1202 (7) The licensee shall also address the nonradiological hazards associated with the wastes in
1203 planning and implementing closure. The licensee shall ensure that disposal areas are closed in a
1204 manner that minimizes the need for further maintenance. To the extent necessary to prevent
1205 threats to human health and the environment, the licensee shall control, minimize, or eliminate
1206 post-closure escape of nonradiological hazardous constituents, leachate, contaminated rainwater,
1207 or waste decomposition products to the ground or surface waters or to the atmosphere.
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Comment [JJ63]:
Editorial change: comma added based on editorial comment made by NRC in letter dated 11/10/2004.

1211 Criterion 6A.

- 1212 (1) For impoundments containing uranium byproduct materials, the final radon barrier must be
1213 completed as expeditiously as practicable considering technological feasibility after the pile or
1214 impoundment ceases operation in accordance with a written, Department-approved reclamation
1215 plan. (The term as expeditiously as practicable considering technological feasibility as specifically

1216 | defined in [section 18.2](#) includes factors beyond the control of the licensee). Deadlines for
 1217 | completion of the final radon barrier and, if applicable, the following interim milestones must be
 1218 | established as a condition of the individual license: windblown tailings retrieval and placement on
 1219 | the pile and interim stabilization including dewatering or the removal of freestanding liquids and
 1220 | recontouring. The placement of erosion protection barriers or other feature necessary for long-
 1221 | term control of the tailings must also be completed in a timely manner in accordance with a
 1222 | written, Department-approved reclamation plan.

1223 | (2) The Department may approve a licensee's request to extend the time for performance of
 1224 | milestones related to emplacement of the final radon barrier if, after providing an opportunity for
 1225 | public participation, the Department finds that the licensee has adequately demonstrated in the
 1226 | manner required in paragraph (2) of Criterion 6 that releases of radon-222 do not exceed an
 1227 | average of 0.74 Becquerel/m² s (20 pCi/m² s). If the delay is approved on the basis that the radon
 1228 | releases do not exceed 0.74 Becquerel/m² s (20 pCi/m² s), a verification of radon levels, as
 1229 | required by paragraph (2) of Criterion 6, must be made annually during the period of delay. In
 1230 | addition, once the Department has established the date in the reclamation plan for the milestone
 1231 | for completion of the final radon barrier, the Department may extend that date based on cost if
 1232 | after providing an opportunity for public participation, the Department finds that the licensee is
 1233 | making good faith efforts to emplace the final radon barrier, the delay is consistent with the
 1234 | definition of available technology, and the radon releases caused by the delay will not result in a
 1235 | significant incremental risk to the public health.

1236 | (3) The Department may authorize by license amendment, upon licensee [reportrequest](#), a portion of
 1237 | the impoundment to accept uranium byproduct material or such materials that are similar in
 1238 | physical, chemical, and radiological characteristics to the uranium mill tailings and associated
 1239 | wastes already in the pile or impoundment from other sources, during the closure process. No
 1240 | such authorization will be made if it results in a delay or impediment to emplacement of the final
 1241 | radon barrier over the remainder of the impoundment in a manner that will achieve levels of
 1242 | radon-222 releases not exceeding 0.74 Becquerel/m² s (20 pCi/m² s) averaged over the entire
 1243 | impoundment. The verification required in paragraph (2) of Criterion 6 may be completed with a
 1244 | portion of the impoundment being used for further disposal if the Department makes a final
 1245 | finding that the impoundment will continue to achieve a level of radon-222 release not exceeding
 1246 | 0.74 Becquerel/m² s (20 pCi/m² s) averaged over the entire impoundment. In this case, after the
 1247 | final radon barrier is complete except for the continuing disposal area, (a) only byproduct material
 1248 | will be authorized for disposal, (b) the disposal will be limited to the specified existing disposal
 1249 | area, and (c) this authorization will only be made after providing opportunity for public
 1250 | participation. Reclamation of the disposal area, as appropriate, must be completed in a timely
 1251 | manner after disposal operations cease in accordance with paragraph (1) of Criterion 6; however,
 1252 | these actions are not required to be complete as part of meeting the deadline for final radon
 1253 | barrier construction.

Comment [JJ64]: Change in wording based on editorial comment made by NRC in letter dated 11/10/2004.

1259 | **Criterion 7.**

1260 | The licensee shall establish a detection monitoring program needed for the Department to set the site-
 1261 | specific ground water protection standards in paragraph 5B(1) of this appendix. For all monitoring under
 1262 | this paragraph, the licensee or applicant will propose for Department approval as license conditions which
 1263 | constituents are to be monitored on a site-specific basis. A detection monitoring program has two
 1264 | purposes. The initial purpose of the program is to detect leakage of hazardous constituents from the
 1265 | disposal area so that the need to set ground water protection standards is monitored. If leakage is
 1266 | detected, the second purpose of the program is to generate data and information needed for the
 1267 | Department to establish the standards under Criterion 5B. The data and information must provide a
 1268 | sufficient basis to identify those hazardous constituents which require concentration limit standards and to
 1269 | enable the Department to set the limits for those constituents and the compliance period. They may also
 1270 | need to provide the basis for adjustments to the point of compliance. The detection monitoring programs
 1271 | must be in place when specified by the Department in orders or license conditions. Once ground water

1272 protection standards have been established pursuant to paragraph 5B(1), the licensee shall establish and
1273 implement a compliance monitoring program. The purpose of the compliance monitoring program is to
1274 determine that the hazardous constituent concentrations in ground water continue to comply with the
1275 standards set by the Department. In conjunction with a corrective action program, the licensee shall
1276 establish and implement a corrective action monitoring program. The purpose of the corrective action
1277 monitoring program is to demonstrate the effectiveness of the corrective actions. Any monitoring program
1278 required by this paragraph may be based on existing monitoring programs to the extent the existing
1279 programs can meet the stated objective for the program.

1280 **Criterion 8.**

1281 Milling operations must be conducted so that all airborne effluent releases are reduced to levels as low as
1282 is reasonably achievable. The primary means of accomplishing this must be by means of emission
1283 controls. Institutional controls, such as extending the site boundary and exclusion area, may be employed
1284 to ensure that offsite exposure limits are met, but only after all practicable measures have been taken to
1285 control emissions at the source. Notwithstanding the existence of individual dose standards, strict control
1286 of emissions is necessary to assure that population exposures are reduced to the maximum extent
1287 reasonably achievable and to avoid site contamination. The greatest potential sources of offsite radiation
1288 exposure (aside from radon exposure) are dusting from dry surfaces of the tailings disposal area not
1289 covered by tailings solution and emissions from yellowcake drying and packaging operations. During
1290 operations and prior to closure, radiation doses from radon emissions from surface impoundments of
1291 uranium or thorium byproduct materials must be kept as low as is reasonably achievable.

1292 Checks must be made and logged hourly for all parameters (e.g., differential pressures and scrubber
1293 water flow rates) that determine the efficiency of yellowcake stack emission control equipment operation.
1294 The licensee shall retain each log as a record for three years after the last entry in the log is made. It
1295 must be determined whether or not conditions are within a range prescribed to ensure that the equipment
1296 is operating consistently near peak efficiency; corrective action must be taken when performance is
1297 outside of prescribed ranges. Effluent control devices must be operative at all times during drying and
1298 packaging operations and whenever air is exhausting from the yellowcake stack. Drying and packaging
1299 operations must terminate when controls are inoperative. When checks indicate the equipment is not
1300 operating within the range prescribed for peak efficiency, actions must be taken to restore parameters to
1301 the prescribed range. When this cannot be done without shutdown and repairs, drying and packaging
1302 operations must cease as soon as practicable. Operations may not be restarted after cessation due to off-
1303 normal performance until needed corrective actions have been identified and implemented. All these
1304 cessations, corrective actions, and restarts must be reported to the Department as indicated in Criterion
1305 8A, in writing, within ten days of the subsequent restart.
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1308 To control dusting from tailings, that portion not covered by standing liquids must be wetted or chemically
1309 stabilized to prevent or minimize blowing and dusting to the maximum extent reasonably achievable. This
1310 requirement may be relaxed if tailings are effectively sheltered from wind, such as may be the case where
1311 they are disposed of below grade and the tailings surface is not exposed to wind. Consideration must be
1312 given in planning tailings disposal programs to methods which would allow phased covering and
1313 reclamation of tailings impoundments because this will help in controlling particulate and radon emissions
1314 during operation. To control dusting from diffuse sources, such as tailings and ore pads where automatic
1315 controls do not apply, operators shall develop written operating procedures specifying the methods of
1316 control which will be utilized.

1317 Milling operations producing or involving uranium and thorium byproduct materials must be conducted in
1318 such a manner as to provide reasonable assurance that the annual dose equivalent does not exceed 0.25
1319 millisievert (25 millirem) to the whole body, 0.75 millisievert (75 millirem) to the thyroid, and 0.25
1320 millisievert (25 millirem) to any other organ of any member of the public as a result of exposures to the
1321 planned discharge of radioactive material, radon and its progeny excepted, to the general environment.

1322 Uranium and thorium byproduct materials must be managed so as to conform to the applicable provisions
1323 of Title 40 of the *Code of Federal Regulations*, Part 440, "Ore Mining and Dressing Point Source
1324 Category: Effluent Limitations Guidelines and New Source Performance Standards, Subpart C, Uranium,
1325 Radium, and Vanadium Ores Subcategory", as codified on January 1, 1983.

1326 Criterion 8A. Inspections of tailings or waste retention systems must be conducted daily during
 1327 operations, or at an alternate frequency approved by the Department for other conditions. Such
 1328 inspections shall be conducted by, or under the supervision of, a qualified engineer or scientist, and
 1329 documented. The licensee shall retain the documentation for each inspection as a record for three years
 1330 after the documentation is made. The Department must be immediately notified of any failure in a tailings
 1331 or waste retention system that results in a release of tailings or waste into unrestricted areas, or any
 1332 unusual conditions (conditions not contemplated in the design of the retention system) that if not
 1333 corrected could indicate the potential or lead to failure of the system and result in a release of tailings or
 1334 waste into unrestricted areas.

1335 **Criterion 9.**

1336 Criterion 9A. These criteria relating to ownership of tailings and their disposal sites became effective on
 1337 November 8, 1981, and apply to all licenses terminated, issued, or renewed after that date.

1338 Criterion 9B. Any uranium or thorium milling license or tailings license must contain such terms and
 1339 conditions as the NRC and Department determine necessary to assure that prior to termination of the
 1340 license, the licensee will comply with ownership requirements of this criterion for sites used for tailings
 1341 disposal.

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1349 Criterion 9C. Title to the byproduct material licensed under this Part 18 and land, including any interests
 1350 therein (other than land owned by the United States or by the State), which is used for the disposal of any
 1351 such byproduct material, or is essential to ensure the long-term stability of such disposal site, must be
 1352 transferred to the United States or the State in which such land is located, at the option of such State. In
 1353 view of the fact that physical isolation must be the primary means of long-term control, and Government
 1354 land ownership is a desirable supplementary measure, ownership of certain severable subsurface
 1355 interests (for example, mineral rights) may be determined to be unnecessary to protect the public health
 1356 and safety and the environment. In any case, however, the applicant/operator must demonstrate a
 1357 serious effort to obtain such subsurface rights, and must in the event that certain rights cannot be
 1358 obtained, provide notification in local public land records of the fact that the land is being used for the
 1359 disposal of radioactive material and is subject to ~~either an NRC or Department~~ general or specific license
 1360 prohibiting the disruption and disturbance of the tailings. In some rare cases, such as may occur with
 1361 deep burial where no ongoing site surveillance will be required, surface land ownership transfer
 1362 requirements may be waived with the approval of the ~~Department and~~ NRC. For licenses issued before
 1363 November 8, 1981, the ~~Department and~~ NRC may take into account the status of the ownership of such
 1364 land, and interests therein, and the ability of a licensee to transfer title and custody thereof to the United
 1365 States or the State.

1366 Criterion 9D. If the NRC, ~~or the Department if title is held by the State,~~ subsequent to title transfer
 1367 determines that use of the surface or subsurface estates, or both, of the land transferred to the United
 1368 States or to a State will not endanger the public health, safety, welfare, or environment, the NRC, ~~or the~~
 1369 ~~Department if title is held by the State, may shall~~ permit the use of the surface or subsurface estates, or
 1370 both, of such land and in a manner consistent with the provisions provided in these criteria. If the NRC, ~~or~~
 1371 ~~the Department if title is held by the state,~~ permits such use of such land, it will provide the person who
 1372 transferred such land with the right of first refusal with respect to such use of such land.

1373 Criterion 9E. Material and land transferred to the United States or the State in accordance with this
 1374 Criterion 9 must be transferred to the United States or the State without cost other than administrative or
 1375 legal costs incurred in carrying out such transfer.

1376 Criterion 9F. The provisions of this part respecting transfer of title and custody to land and tailings and
 1377 wastes do not apply in the case of lands held in trust by the United States for any Indian tribe or lands
 1378 owned by such Indian tribe subject to a restriction against alienation imposed by the United States. In the

Comment [JJ65]:
 In order to meet the compatibility for the equivalent section in 10 CFR 40, Criterion 11, NRC requires that references to the Department (CDPHE) be deleted since NRC has regulatory jurisdiction for the matters discussed in Criterion 9C, and 9D.
 NRC Ltr dated 06/28/12 (#28)
 10 CFR 40.2a; 10 CFR Part 40, Appendix A.
 Compatibility = NRC

Comment [JJ66]:
 The changes in Criterion 9C, and 9D are a result of comments from the NRC in correspondence dated March 28, 2002.
 The basis for the comment is that the NRC retains regulatory jurisdiction in the matters described in Criterion 9C and 9D.
 NRC Ltr dated 03/28/02
 10 CFR 40.2a; 10 CFR Part 40, Appendix A.

1379 case of such lands which are used for the disposal of uranium or thorium byproduct material, as defined
1380 | in [this Part 4](#), the licensee shall enter into arrangements with the NRC as may be appropriate to assure
1381 the long-term surveillance of such lands by the United States.

Comment [JJ67]: Consistent with the addition of a definition for type 2 byproduct material in 18.2, the language is modified here.

1382 **Criterion 10.**

1383 Secondary ground-water protection standards required by Criterion 5 of this Appendix are concentration
1384 limits for individual hazardous constituents. The following list of constituents identifies the constituents for
1385 which standards must be set and complied with if the specific constituent is reasonably expected to be in
1386 or derived from the radioactive material and has been detected in ground water. For purposes of this
1387 Appendix, the property of gross alpha activity will be treated as if it is a hazardous constituent. Thus,
1388 when setting standards under paragraph 5B(5) of Criterion 5, the Department will also set a limit for gross
1389 alpha activity. The Department does not consider the following list imposed by 40 CFR Part 192 to be
1390 exhaustive and may determine other constituents to be hazardous on a case-by-case basis, independent
1391 of those specified by the U.S. Environmental Protection Agency in Part 192.

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1396	PART 18 - CRITERION 10 HAZARDOUS CONSTITUENTS
1397	- Acetonitrile (Ethanenitrile)
1398	- Acetophenone (Ethanone, 1-phenyl)
1399	- 3-(alpha-Acetylbenzyl)-4-hydroxycoumarin and salts (Warfarin)
1400	- 2-Acetylaminofluorene (Acetamide, N-(9H- fluoren-2-yl)-)
1401	- Acetyl chloride (Ethanoyl chloride)
1402	- 1-Acetyl-2-thiourea (Acetamide, N- (aminothioxomethyl)-)
1403	- Acrolein (2-Propenal)
1404	- Acrylamide (2-Propenamide)
1405	- Acrylonitrile (2-Propenenitrile)
1406	- Aflatoxins
1407	- Aldrin (1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a,8b-hexahydro-endo,exo-1,4:5,8-
1408	Dimethanonaphthalene)
1409	- Allyl alcohol (2-Propen-1-ol)
1410	- Aluminum phosphide
1411	- 4-Aminobiphenyl ([1,1-Biphenyl])-4-amine)
1412	- 6-Amino-1,1a,2,8,8a,8b-hexahydro-8-(hydroxymethyl)-8a-methoxy-5-methyl-carbamate
1413	azirino(2,3:3,4)pyrrolo(1,2-a]indole-4,7-dione,(ester) (Mitomycin C) (Azirino[2,3:3,4]pyrrolo(1,2-
1414	a]indole-4,7-dione,6-amino-8-(((amino-cabonyl)oxy)methyl)-1,1a,2,8,8a,8b-hexahydro-8a
1415	methoxy-5-methyl-)
1416	- 5-(Aminomethyl)-3-isoxazolol (3(2H)-Isoxazolone, 5-(aminomethyl)-4-Aminopyridine (4-
1417	Pyridinamine)
1418	- Amitrole (1H-1,2,4-Triazol-3-amine)
1419	- Aniline (Benzenamine)
1420	- Antimony and compounds, N.O.S. ³
1421	- Aramite (Sulfurous acid,2-chloroethyl-,2-(4-(1,1-dimethylethyl)phenoxy)-1-methylethyl ester)
1422	- Arsenic and compounds, N.O.S. ³
1423	- Arsenic acid (Orthoarsenic acid)
1424	- Arsenic pentoxide (Arsenic (V) oxide)
1425	- Arsenic trioxide (Arsenic (III) oxide)
1426	- Auramine (Benzenamine,4,4-carbonimidoylbis (N,N-Dimethyl-,monohydrochloride)
1427	- Azaserine (L-Serine, diazoacetate (ester))

- 1428 - Barium and compounds, N.O.S.³
- 1429 - Barium cyanide
- 1430 - Benz(c)acridine (3,4-Benzacridine)
- 1431 - Benz(a)anthracene (1,2-Benzanthracene)
- 1432 - Benzene (Cyclohexatriene)
- 1433 - Benzenearsonic acid (Arsonic acid, phenyl-)
- 1434 - Benzene, dichloromethyl-(Benzal chloride)
- 1435 - Benzenethiol (Thiophenol)
- 1436 - Benzidine ([1,1-Biphenyl]-4,4 diamine)
- 1437 - Benzo(b)fluoranthene (2,3-Benzofluoranthene)
- 1438 - Benzo(j)fluoranthene (7,8-Benzofluoranthene)
- 1439 - Benzo(a)pyrene (3,4-Benzopyrene)
- 1440 - p-Benzoquinone (1,4-Cyclohexadienedione)
- 1441 - Benzotrichloride (Benzene, Trichloromethyl)
- 1442 - Benzyl chloride (Benzene, (chloromethyl)-)
- 1443 - Beryllium and compounds, N.O.S.³
- 1444 - Bis(2-chloroethoxy)methane (Ethane,1,1-(methylenebis(oxy))[bis[2-chloro-]])
- 1445 - Bis(2-chloroethyl) ether (Ethane, 1,1-oxybis (2-chloro-))
- 1446 - N,N-Bis(2-chloroethyl)-2-naphthylamine (Chlornaphazine)
- 1447 - Bis(2-Chloroisopropyl) ether (Propane, 2,2-oxybis[2-chloro-])
- 1448 - Bis(chloromethyl) ether (methane,oxybis[chloro-])
- 1449 - Bis(2-ethylhexyl) phthalate (1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester)
- 1450 - Bromoacetone (2-Propanone, 1-bromo-)
- 1451 - Bromomethane (Methyl bromide)
- 1452 - 4-Bromophenyl phenyl ether (Benzene, 1-bromo-4-phenoxy-)
- 1453 - Brucine (Strychnidin-10-one, 2,3-dimethoxy-)
- 1454 - 2-Butanone peroxide (Methyl ethyl ketone,peroxide)
- 1455 - Butyl benzyl phthalate (1,2-Benzenedicarboxylic acid, butylphenylmethyl ester)
- 1456 - 2-sec-Butyl-4,6-dinitrophenol (DNBP) (Phenol,2,4-dinitro-6-(1-methylpropyl)-)
- 1457 - Cadmium and compounds, N.O.S.³

- 1458 - Calcium chromate (Chromic acid, calcium salt)
- 1459 - Calcium cyanide
- 1460 - Carbon disulfide (Carbon bisulfide)
- 1461 - Carbon oxyfluoride (Carbonyl fluoride)
- 1462 - Chloral (Acetaldehyde, trichloro-)
- 1463 - Chlorambucil (Butanoic acid, 4-(bis(2-chloroethyl)amino)benzene-)
- 1464 - Chlordane (alpha and gamma isomers)4,7-Methanoindan, 1,2,4,5,6,7,8,8-octachloro-3,4,7,7a-
1465 tetrahydro-) (alpha and gamma isomers)
- 1466 - Chlorinated benzenes, N.O.S.³
- 1467 - Chlorinated ethane, N.O.S.³
- 1468 - Chlorinated fluorocarbons, N.O.S.³
- 1469 - Chlorinated naphthalene, N.O.S.³
- 1470 - Chlorinated phenol, N.O.S.³
- 1471 - Chloroacetaldehyde (Acetaldehyde, chloro-)
- 1472 - Chloroalkyl ethers N.O.S.³
- 1473 - p-Chloroaniline (Benzenamine, 4-chloro-)
- 1474 - Chlorobenzene (Benzene, chloro-)
- 1475 - Chlorobenzilate (Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-,ethyl ester)
- 1476 - p-Chloro-m-cresol (Phenol, 4-chloro-3-methyl)
- 1477 - 1-Chloro-2,3-epoxypropane (Oxirane, 2-(chloromethyl)-)
- 1478 - 2-Chloroethyl vinyl ether (Ethene, (2-chloroethoxy)-)
- 1479 - Chloroform (Methane, trichloro-)
- 1480 - Chloromethane (Methyl chloride)
- 1481 - Chloromethyl methyl ether (Methane, chloromethoxy-)
- 1482 - 2-Chloronaphthalene (Naphthalene, beta-chloro-)
- 1483 - 2-Chlorophenol (Phenol, o-chloro-)
- 1484 - 1-(o-Chlorophenyl) thiourea (Thiourea, (2-chlorophenyl)-)
- 1485 - 3-Chloropropionitrile (Propanenitrile, 3-chloro-)
- 1486 - Chromium and compounds, N.O.S.³
- 1487 - Chrysene (1,2-Benzphenanthrene)

- 1488 - Citrus red No. 2 (2-Naphthol, 1-((2,5-dimethoxyphenyl)azo)-)
- 1489 - Coal tars
- 1490 - Copper cyanide
- 1491 - Creosote (Creosote, wood)
- 1492 - Cresols (Cresylic acid) (Phenol, methyl-)
- 1493 - Crotonaldehyde (2-Butenal)
- 1494 - Cyanides (soluble salts and complexes),N.O.S.³
- 1495 - Cyanogen (Ethanedinitrile)
- 1496 - Cyanogen bromide (Bromine cyanide)
- 1497 - Cyanogen chloride (Chlorine cyanide)
- 1498 - Cycasin (beta-D-Glucopyranoside, (methyl-ONN-azoxy)methyl-)
- 1499 - 2-Cyclohexyl-4,6-dinitrophenol (phenol, 2-cyclohexyl-4,6-dinitro-)
- 1500 - Cyclophosphamide (2H-1,3,2-Oxazaphosphorine (bis(2-chloroethyl)amino)-tetrahydro-,2-oxide)
- 1501 - Daunomycin (5,12-Naphthacenedione, (8S-cis)-8-acetyl-10-((3-amino-2,3,6-trideoxy)-alpha-L-lyxo-hexopyranosyl)oxy)7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-)
- 1502
- 1503 - DDD (Dichlorodipenyldichloroethane)(Ethane, 1,1-dichloro-2,2-bis(p-chlorophenyl)-)
- 1504 - DDE (Ethylene, 1,1-dichloro-2,2-bis(4-chlorophenyl)-)
- 1505 - DDT (Dichlorodiphenyltrichloroethane) (Ethane, 1,1,1-trichloro-2,2-bis (p-chlorophenyl)-)
- 1506 - Diallylate (S-(2,3-dichloroallyl)diisopropylthiocarbamate)
- 1507 - Dibenz(a,h)acridine(1,2,5,6-Dibenzacridine)
- 1508 - Dibenz(a,j)acridine(1,2,7,8-Dibenzacridine)
- 1509 - Dibenz(a,h)anthracene (1,2,5,6-Dibenzanthracene)
- 1510 - 7H-Dibenzo(c,g)carbazole (3,4,5,6-Dibenzcarbazole)
- 1511 - Dibenzo(a,e)pyrene(1,2,4,5-Dibenzpyrene)
- 1512 - Dibenzo(a,h)pyrene(1,2,5,6-Dibenzpyrene)
- 1513 - Dibenzo(a,i)pyrene(1,2,7,8-Dibenzpyrene)
- 1514 - 1,2-Dibromo-3-chloropropane (Propane, 1,2-dibromo-3-chloro-)
- 1515 - 1,2 Dibromoethane (Ethylene dibromide)
- 1516 - Dibromomethane (Methylene bromide)
- 1517 - Di-n-butyl phthalate (1,2-Benzenedicarboxylic acid, dibutyl ester)

- 1518 - o-Dichlorobenzene (Benzene, 1,2-dichloro-)
- 1519 - m-Dichlorobenzene (Benzene, 1,3-dichloro-)
- 1520 - p-Dichlorobenzene (Benzene, 1,4-dichloro-)
- 1521 - Dichlorobenzene, N.O.S.³ (Benzene, dichloro-N.O.S.³)
- 1522 - 3,3-Dichlorobenzidine ([1,1, Biphenyl]-4,4-diamine, 3,3-dichloro-)
- 1523 - 1,4-Dichloro-2-butene (2-Butene, 1,4-dichloro-)
- 1524 - Dichlorodifluoromethane (Methane, dichlorodifluoro-)
- 1525 - 1,1 Dichloroethane (Ethylidene dichloride)
- 1526 - 1,2 Dichloroethane (Ethylene dichloride)
- 1527 - trans-1,2-Dichloroethene (1,2-Dichloroethylene)
- 1528 - Dichloroethylene, N.O.S.³ (Ethene, dichloro-N.O.S.³)
- 1529 - 1,1-Dichloroethylene (Ethene, 1,1-dichloro-)
- 1530 - Dichloromethane (Methylene chloride)
- 1531 - 2,4-Dichlorophenol (Phenol, 2,4-dichloro-)
- 1532 - 2,6-Dichlorophenol (Phenol, 2,6-dichloro-)
- 1533 - 2,4-Dichlorophenoxyacetic acid (2,4-D), salts and esters (Acetic acid, 2,4-dichlorophenoxy-, salts
1534 and esters)
- 1535 - Dichlorophenylarsine (Phenyl dichloroarsine)
- 1536 - Dichloropropane, N.O.S.³ (Propane, dichloro-N.O.S.³)
- 1537 - 1,2-Dichloropropane (Propylene dichloride)
- 1538 - Dichloropropanol, N.O.S.³ (Propanol, dichloro-N.O.S.³)
- 1539 - Dichloropropene, N.O.S.³ (Propene, dichloro-N.O.S.³)
- 1540 - 1,3-Dichloropropene (1-Propene, 1,3-dichloro-)
- 1541 - Dieldrin (1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octa-hydro-endo,exo-1,4:5,8-
1542 Dimethanonaphthalene)
- 1543 - 1,2:3,4-Diepoxybutane (2,2,-Bioxirane)
- 1544 - Diethylarsine (Arsine, diethyl-)
- 1545 - N,N-Diethylhydrazine (Hydrazine, 1,2-diethyl)
- 1546 - O,O-Diethyl S-methyl ester of phosphorodithioic acid (Phosphorodithioic acid, O,O-diethyl S-
1547 methyl ester)
- 1548 - O,O-Diethylphosphoric acid, O-p-nitrophenyl ester (Phosphoric acid, diethyl p-nitrophenyl ester)

- 1549 - Diethyl phthalate (1,2-Benzenedicarboxylic acid, diethyl ester)
- 1550 - O,O-Diethyl O-2-pyrazinyl phosphorothioate (Phosphorothioic acid, O,0-diethyl O-pyrazinyl ester)
- 1551 - Diethylstilbesterol (4,4-Stilbenediol, alpha, alpha-diethyl, bis(dihydrogen phosphate, (E)-)
- 1552 - Dihydrosafrole (Benzene, 1,2-methylenedioxy-4-propyl-)
- 1553 - 3,4-Dihydroxy-alpha-(methylamino)methylbenzyl alcohol (1,2-Benzenediol, 4-(1-hydroxy-2
1554 (methylamino)ethyl))
- 1555 - Dilsopropylfluorophosphate (DFP) (Phosphorofluoridic acid, bis(1-methylethyl) ester)
- 1556 - Dimethoate (Phosphorodithioic acid, O,O-dimethyl S-(2-(methylamino)-2-oxoethyl) ester)
- 1557 - 3,3-Dimethoxybenzidine ((1,1,-Biphenyl)-4,4,-diamine, 3-3,-dimethoxy-)
- 1558 - p-Dimethylaminoazobenzene (Benzenamine, N,N-dimethyl-4-(phenylazo)-)
- 1559 - 7,12-Dimethylbenz(a)anthracene(1,2-Benzathracene, 7,12-dimethyl-)
- 1560 - 3,3-Dimethylbenzidine (1,1-Biphenyl)-4,4,diamine, 3,3-dimethyl-)
- 1561 - Dimethylcarbamoyl chloride (Carbamoyl chloride, dimethyl)
- 1562 - 1,1 Dimethylhydrazine (Hydrazine, 1,1-dimethyl-)
- 1563 - 1,2-Dimethylhydrazine (Hydrazine, 1,2-dimethyl-)
- 1564 - 3,3-Dimethyl-1-(methylthio)-2-butanone, O-[(methylamino) carbonyl] oxime (Thiofanox)
- 1565 - alpha, alpha-Dimethylphenethylamine (Ethanamine, 1,1-dimethyl-2-phenyl-)
- 1566 - 2,4-Dimethylphenol (Phenol, 2,4-dimethyl-)
- 1567 - Dimethyl phthalate (1,2-Benzenedicarboxylic acid, dimethyl ester)
- 1568 - Dimethyl sulfate (Sulfuric acid, dimethyl ester)
- 1569 - Dinitrobenzene, N.O.S.³ (Benzene, dinitro-N.O.S.³)
- 1570 - 4,6-Dinitro-o-cresol and salts (Phenol, 2,4-dinitro-6-methyl-, and salts)
- 1571 - 2,4-Dinitrophenol (Phenol, 2,4-dinitro-)
- 1572 - 2,4-Dinitrotoluene (Benzene, 1-methyl-2,4-dinitro-)
- 1573 - 2,6-Dinitrotoluene (Benzene, 1-methyl 2,6-dinitro-)
- 1574 - Di-n-octyl phthalate (1,2-Benzenedicarboxylic acid, dioctyl ester)
- 1575 - 1,4-Dioxane (1,4-Diethylene oxide)
- 1576 - Diphenylamine (Benzenamine, N-phenyl-)
- 1577 - 1,2-Diphenylhydrazine (Hydrazine, 1,2-diphenyl-)
- 1578 - Di-n-propylnitrosamine (N-Nitroso-di-n-propylamine)

- 1579 - Disulfoton (O,O-diethyl S-(2-(ethylthio)ethyl) phosphorodithioate)
- 1580 - 2,4-Dithiobiuret (Thiomidodicarbonic diamide)
- 1581 - Endosulfan (5-Norbomene, 2,3-dimethanol,1,4,5,6,7,7-hexachloro-cyclic sulfite)
- 1582 - Endrin and metabolites (1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo,
1583 endo-1,4,5,8-dimethanonaphthalene, and metabolites)
- 1584 - Ethyl carbamate (Urethan) (Carbamic acid, ethyl ester)
- 1585 - Ethyl cyanide (Propanenitrile)
- 1586 - Ethylenebisdithiocarbamic acid, salts, and esters (1,2-Ethanediy-biscarbamodithioic acid, salts
1587 and esters)
- 1588 - Ethyleneimine (Aziridine)
- 1589 - Ethylene oxide (Oxirane)
- 1590 - Ethylenethiourea (2-Imidazolidinethione)
- 1591 - Ethyl methacrylate (2-Propenoic acid, 2-methyl-, ethyl ester)
- 1592 - Ethyl methanesulfonate (Methanesulfonic acid, ethyl ester)
- 1593 - Fluoranthene (Benzo[j,k]fluorene)
- 1594 - Fluorine
- 1595 - 2-Fluoroacetamide (Acetamide, 2-fluoro-)
- 1596 - Fluoroacetic acid, sodium salt (Acetic acid, fluoro-sodium salt)
- 1597 - Formaldehyde (Methylene oxide)
- 1598 - Formic acid (Methanoic acid)
- 1599 - Glycidylaldehyde (1-Propanol-2,3 epoxy)
- 1600 - Halomethane, N.O.S. ³
- 1601 - Heptachlor (4,7-Methano-1H-indene.1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-)
- 1602 - Heptachlor epoxide (alpha, beta, and gamma isomers) (4,7-Methano-1H-indene, 1,4,5,6,7,8,8-
1603 heptachloro-2,3-epoxy-3a,4,7,7-tetrahydro-,alpha, beta, and gamma isomers)
- 1604 - Hexachlorobenzene (Benzene, hexachloro-)
- 1605 - Hexachlorobutadiene (1,3-Butadiene, 1,1,2,3,4,4-hexachloro-)
- 1606 - Hexachlorocyclohexane (all isomers) (Lindane and isomers)
- 1607 - Hexachlorocyclopentadiene (1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-)
- 1608 - Hexachloroethane (Ethane, 1,1,1,2,2,2-hexachloro-)
- 1609 - 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4,5,8-endo,endo-dimethanonaphthalene
1610 (Hexachlorohexa-hydro-endo,endo-dimethanonaphthalene)

- 1611 - Hexachlorophene (2,2,-Methylenebis(3,4,6-trichlorophenol))
- 1612 - Hexachloropropene (1-Propene, 1,1,2,3,3,3-hexachloro-)
- 1613 - Hexaethyl tetraphosphate (Tetraphosphoric acid, hexaethyl ester)
- 1614 - Hydrazine (Diamine)
- 1615 - Hydrocyanic acid (Hydrogen cyanide)
- 1616 - Hydrofluoric acid (Hydrogen fluoride)
- 1617 - Hydrogen sulfide (Sulfur hydride)
- 1618 - Hydroxydimethylarsine oxide (Cacodylic acid)
- 1619 - Indeno (1,2,3-cd)pyrene(1,10-(1,2-phenylene)pyrene)
- 1620 - Iodomethane (Methyl iodide)
- 1621 - Iron dextran (Ferric dextran)
- 1622 - Isocyanic acid, methyl ester (Methyl isocyanate)
- 1623 - Isobutyl alcohol (1-Propanol, 2-methyl-)
- 1624 - Isosafrole (Benzene, 1,2-methylenedioxy-4-allyl-)
- 1625 - Kepone (decachlorooctahydro-1,3,4-Methano-2H-cyclobuta[cd]pentalen-2-one)
- 1626 - Lasiocarpine (2-Butenoic acid, 2-methyl-,7-[(2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy) methyl]2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl-ester)
- 1627
- 1628 - Lead and compounds, N.O.S.³
- 1629 - Lead acetate (Acetic acid, lead salt)
- 1630 - Lead phosphate (Phosphoric acid, lead salt)
- 1631 - Lead subacetate (Lead, bis(acetato-O)tetrahydroxytri-)
- 1632 - Maleic anhydride (2,5-Furandione)
- 1633 - Maleic hydrazide (1,2-Dihydro-3,6-pyridazinedione)
- 1634 - Malononitrile (Propanedinitrile)
- 1635 - Melphalan (Alanine, 3-(p-bis(2-chloroethyl)amino)phenyl-L)- Mercury fulminate (Fulminic acid, mercury salt)
- 1636
- 1637 - Mercury and compounds, N.O.S.³
- 1638 - Methacrylonitrile (2-Propenenitrile,2-methyl-)
- 1639 - Methanethiol (Thiomethanol)
- 1640 - Methapyrilene (Pyridine, 2-[(2-dimethylamino)ethyl]-2-thenylamino-)
- 1641 - Metholmyl (Acetimidic acid, N-[(methylcarbamoyl)oxy] thio-,methyl ester)

- 1642 - Methoxychlor (Ethane, 1,1,1-trichloro-2,2-bis(p-methoxyphenyl)-)
- 1643 - 2-Methylaziridine (1,2-Propylenimine)
- 1644 - 3-Methylcholanthrene (Benz[*a*]aceanthrylene, 1,2-dihydro-3-methyl-)
- 1645 - Methyl chlorcarbonate (Carbonochloridicacid, methyl ester)
- 1646 - 4,4'-Methylenebis (2-chloroaniline) Benzenamine, 4,4'-methylenebis-(2-chloro-)
- 1647 - Methyl ethyl ketone (MEK) (2-Butanone)
- 1648 - Methyl hydrazine (Hydrazine methyl-)
- 1649 - 2-Methylacetonitrile (Propanenitrile 2-hydroxy-2-methyl-)
- 1650 - Methyl methacrylate (2-Propenoic acid, 2-methyl-, methyl ester)
- 1651 - Methyl methanesulfonate Methanesulfonicacid, methyl ester)
- 1652 - 2-Methyl-2-(methylthio)propionaldehyde-o-(methylcarbonyl) oxime (Propanal,2-methyl-
1653 2(methylthio-0-[(methylamino)carbonyl]oxime)
- 1654 - N-Methyl-N'-nitro-N-nitrosoguanidine (Guanidine, N-nitroso-N-methyl-N'-nitro-)
- 1655 - Methyl parathion (0,0-dimethyl 0-(40 nitrophenyl) phosphorothioate)
- 1656 - Methylthiouracil (4-IH-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-)
- 1657 - Molybdenum and compounds, N.O.S.³
- 1658 - Mustard gas (Sulfide, bis(2-chloroethyl)-)
- 1659 - Naphthalene
- 1660 - 1,4-Naphthoquinone (1,4-Naphthalenedione)
- 1661 - 1-Naphthylamine (alpha-Naphthylamine)
- 1662 - 2-Naphthylamine (beta-Naphthylamine)
- 1663 - 1-Naphthyl-2-thiourea (Thiourea, 1-naphthalenyl-)
- 1664 - Nickel and compounds, N.O.S.³
- 1665 - Nickel carbonyl (Nickel tetracarbonyl)
- 1666 - Nickel cyanide (Nickel (II) cyanide)
- 1667 - Nicotine and salts (Pyridine, (S)-3-(1-methyl-2-pyrrolidinyl)-, and salts)
- 1668 - Nitric oxide (Nitrogen (II) oxide)
- 1669 - p-Nitroaniline (Benzenamine, 4-nitro-)
- 1670 - Nitrobenzene (Benzene, nitro-)
- 1671 - Nitrogen dioxide (Nitrogen (IV) oxide)

Comment [JJ68]: Technical formula correction are made in this list, consistent with comments made by NRC to the Conference of Radiation Control Program Directors, Inc. (CRCPD) regarding the Part U regulation.

The correction adds a "prime" (') symbol to the formula.

NRC Letter to CRCPD dated 12/23/13.
http://www.crcpd.org/SSRCRs/nrc_Part-U_letter_12-23-2013.pdf

Comment [JJ69]: Technical formula correction similar to that above.

Comment [JJ70]: Technical formula correction similar to that above.

- 1672 - Nitrogen mustard and hydrochloride salt (Ethanamine, 2-chloro-,N-(2-chloroethyl)-N-methyl-, and
1673 hydrochloride salt)
- 1674 - Nitrogen mustard N-Oxide and hydrochloride salt (Ethanamine, 2-chloro,N-(2-chloroethyl)-N-
1675 methyl-and hydrochloride salt)
- 1676 - Nitroglycerine (1,2,3-Propanetriol, trinitrate)
- 1677 - 4-Nitrophenol (Phenol, 4-nitro)
- 1678 - 4-Nitroquinoline-1-oxide (Quinoline,4-nitro-1-oxide-)
- 1679 - Nitrosamine, N.O.S.³
- 1680 - N-Nitrosodi-n-butylamine (1-Butanamine,N-butyl-N-nitroso-)
- 1681 - N-Nitrosodiethanolamine (Ethanol, 2,2'-(nitrosoimino)bis-)
- 1682 - N-Nitrosodiethylamine (Ethanamine, N-ethyl-N-nitroso-)
- 1683 - N-Nitrosodimethylamine (Dimethylnitrosamine)
- 1684 - N-Nitroso-N-ethylurea (Carbamide, N-ethyl-N-nitroso-)
- 1685 - N-Nitrosomethylethylamine (Ethanamine, N-methyl-N-nitroso-)
- 1686 - N-Nitroso-N-methylurea (Carbamide, N-methyl-N-nitroso-)
- 1687 - N-Nitroso-N-methylurethane (Carbamic acid, methylnitroso-, ethyl ester)
- 1688 - N-Nitrosomethylvinylamine (Ethenamine,N-methyl-N-nitroso-)
- 1689 - N-Nitrosomorpholine (Morpholine,-N-nitroso-)
- 1690 - N-Nitrosonomicotine (Nornicotine,-N-nitroso-)
- 1691 - N-Nitrosopiperidine (Pyridine, hexahydro-,N-nitroso-)
- 1692 - Nitrosopyrrolidine (Pyrrole, tetrahydro-N-nitroso-)
- 1693 - N-Nitrososarcosine (Sarcosine,-N-nitroso-)
- 1694 - 5-Nitro-o-toluidine (Benzenamine, 2-methyl-5-nitro-)
- 1695 - Octamethylpyrophosphoramidate (Diphosphoramidate, octamethyl-)
- 1696 - Osmium tetroxide (Osmium(VIII)oxide)
- 1697 - 7-Oxabicyclo(2,2,1)heptane-2,3-dicarboxylic acid (Endothal)
- 1698 - Paraldehyde (1,3,5-Trioxane, 2,4,6-trimethyl-)
- 1699 - Parathion (Phosphorothioic acid O,O-diethylO-(p-nitrophenyl) ester)
- 1700 - Pentachlorobenzene (Benzene, pentachloro-)
- 1701 - Pentachloroethane (Ethane, pentachloro-)
- 1702 - Pentachloronitrobenzene (PCNB) (Benzene, Pentachloronitro-)

Comment [JJ71]: Technical formula correction similar to that above.

- 1703 - Pentachlorophenol (Phenol, pentachloro-)
- 1704 - Phenacetin (Acetamide, N-(4-ethoxyphenyl)-)
- 1705 - Phenol (Benzene, hydroxy-)
- 1706 - Phenylenediamine (Benzenediamine)
- 1707 - Phenylmercury acetate (Mercury acetatophenyl-)
- 1708 - N-Phenylthiourea (Thiourea, phenyl-)
- 1709 - Phosgene (Carbonyl chloride)
- 1710 - Phosphine (Hydrogen phosphide)
- 1711 - Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl]ester (Phorate)
- 1712 - Phosphorothioic acid, O,O-dimethyl O-(p-[(dimethylamino)sulfonyl]phenyl)ester (Famphur)
- 1713 - Phthalic acid esters, N.O.S.³ (Benzene, 1,2-dicarboxylic acid, esters, N.O.S.³)
- 1714 - Phthalic anhydride (1,2-Benzenedicarboxylic acid anhydride)
- 1715 - 2-Picoline (Pyridine, 2-methyl-)
- 1716 - Polychlorinated biphenyl, N.O.S.³
- 1717 - Potassium cyanide
- 1718 - Potassium silver cyanide (Argentate(1-),dicyano-,potassium)
- 1719 - Pronamide (3,5-Dichloro-N-(1,1-dimethyl-2-propynyl)benzamide)
- 1720 - 1,3 Propane sultone (1,2-Oxathiolane, 2,2-dioxide)
- 1721 - n-Propylamine (1-Propanamine)
- 1722 - Propylthiouracil (Undecamethylenediamine,N,N-bis(2-chlorobenzyl-),dihydrochloride)
- 1723 - 2-Propyn-1-ol (Propargyl alcohol)
- 1724 - Pyridine
- 1725 - Radium-226 and -228
- 1726 - Reserpine (Yohimban-16-carboxylic acid,11,17-dimethoxy-18-[3,4,5-trimethoxybenzoyl]oxy)-
1727 methyl ester)
- 1728 - Resorcinol (1,3-Benzenediol)
- 1729 - Saccharin and salts (1,2-Benzoisothiazolin-3-one, 1,1-dioxide, and salts)
- 1730 - Safrele (Benzene, 1,2-methylenedioxy-4-allyl-)
- 1731 - Selenious acid (Selenium dioxide)
- 1732 - Selenium and compounds, N.O.S.³

- 1733 - Selenium sulfide (Sulfur selenide)
- 1734 - Selenourea (Carbamimidoseleonic acid)
- 1735 - Silver and compounds, N.O.S.³
- 1736 - Silver cyanide
- 1737 - Sodium cyanide
- 1738 - Streptozotocin (D-Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-)
- 1739 - Strontium sulfide
- 1740 - Strychnine and salts (Strychnidin-10-one, and salts)
- 1741 - 1,2,4,5-Tetrachlorobenzene (Benzene,1,2,4,5-tetrachloro-)
- 1742 - 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) (Dibenzo-p-dioxin, 2,3,7,8-tetrachloro-)
- 1743 - Tetrachloroethane, N.O.S.³ (Ethane, tetrachloro-N.O.S.³)
- 1744 - 1,1,1,2-Tetrachlorethane (Ethane, 1,1,1,2-tetrachloro-)
- 1745 - 1,1,2,2-Tetrachlorethane (Ethane 1,1,2,2-tetrachloro-)
- 1746 - Tetrachlorethane (Ethene, 1,1,2,2-tetrachloro-)
- 1747 - Tetrachloromethane (Carbon tetrachloride)
- 1748 - 2,3,4,6-Tetrachlorophenol (Phenol 2,3,4,6-tetrachloro-)
- 1749 - Tetraethyldithiopyrophosphate (Dithiopyrophosphoric acid, tetraethyl-ester)
- 1750 - Tetraethyl lead (Plumbane, tetraethyl-)
- 1751 - Tetraethylpyrophosphate (Pyrophosphoricacide, tetraethyl ester)
- 1752 - Tetranitromethane (Methane, tetranitro-)
- 1753 - Thallium and compounds, N.O.S.³
- 1754 - Thallic oxide (Thallium (III) oxide)
- 1755 - Thallium (I) acetate (Acetic acid, thallium (I) salt)
- 1756 - Thallium (I) carbonate (Carbonic acid dithallium (I) salt)
- 1757 - Thallium (I) chloride
- 1758 - Thallium (I) nitrate (Nitric acid, thallium (I) salt)
- 1759 - Thallium selenite
- 1760 - Thallium (I) sulfate (Sulfuric acid, thallium (I) salt)
- 1761 - Thioacetamide (Ethanethioamide)
- 1762 - Thiosemicarbazide (Hydrazinecarbothioamide)

- 1763 - Thiourea (Carbamide thio-)
- 1764 - Thiuram (Bis(dimethylthiocarbamoyl) disulfide)
- 1765 - Thorium and compounds, N.O.S.³ when producing thorium byproduct material
- 1766 - Toluene (Benzene, methyl-)
- 1767 - Toluenediamine (Diaminotoluene)
- 1768 - o-Toluidine hydrochloride (Benzenamine, 2-methyl-,hydrochloride)
- 1769 - Toluene diisocyanate (Benzene, 1,3-diisocyanatomethyl-)
- 1770 - Toxaphene (Camphene, octachloro-)
- 1771 - Tribromomethane (Bromoform)
- 1772 - 1,2,4-Trichlorobenzene (Benzene, 1,2,4-trichloro-)
- 1773 - 1,1,1-Trichloroethane (Methyl chloroform)
- 1774 - 1,1,2-Trichloroethane (Ethane, 1,1,2-trichloro-)
- 1775 - Trichloroethene (Trichloroethylene)
- 1776 - Trichloromethanethiol (Methanethiol, trichloro-)
- 1777 - Trichloromonofluoromethane (Methane, trichlorofluoro-)
- 1778 - 2,4,5-Trichlorophenol (Phenol, 2,4,5-trichloro-)
- 1779 - 2,4,6-Trichlorophenol (Phenol, 2,4,6-trichloro-)
- 1780 - 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T) (Acetic acid, 2,4,5-trichlorophenoxy-)
- 1781 - 2,4,5-Trichlorophenoxypropionic acid (2,4,5-TP) (Silvex) (Propionic acid, 2-(2,4,5-
1782 trichlorophenoxy)-)
- 1783 - Trichloropropane, N.O.S.³ (Propane, trichloro-, N.O.S.³)
- 1784 - 1,2,3-Trichloropropane (Propane, 1,2,3-trichloro-)
- 1785 - O,O,O-Triethyl phosphorothioate (Phosphorothioic acid, O,O,O-triethyl ester)
- 1786 - sym-Trinitrobenzene (Benzene, 1,3,5-trinitro-)
- 1787 - Tris(1-aziridinyl) phosphine sulfide (Phosphine sulfide, tris(1-aziridinyl-)
- 1788 - Tris(2,3-dibromopropyl) phosphate (1-Propanol, 2,3-dibromo-, phosphate)
- 1789 - Trypan blue (2,7-Naphthalenedisulfonic acid, 3,3,-((3,3,-dimethyl (1,1,-biphenyl)-
1790 4,4,diyl)bis(azo))bis(5-amino-4-hydroxy-tetrasodium salt)
- 1791 - Uracil mustard (Uracil-5-[bis(2-chloroethyl)amino]-)
- 1792 - Uranium and compounds, N.O.S.³
- 1793 - Vanadic acid, ammonium salt (ammonium vanadate)

1794 - Vanadium pentoxide (Vanadium (V) oxide)

1795 - Vinyl chloride (Ethene, chloro-)

1796 - Zinc cyanide

1797 - Zinc phosphide

1798 3 The abbreviation N.O.S. (not otherwise specified) signifies those members of the general class not specifically listed by name in
1799 this list.

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1801 **EDITOR'S NOTES**

1802 6 CCR 1007-1 has been divided into separate parts for ease of use. Versions prior to 04/01/2007 are
1803 located in the first section, 6 CCR 1007-1. Prior versions can be accessed from the All Versions list on the
1804 rule's current version page. To view versions effective on or after 04/01/2007, select the desired part of
1805 the rule, for example 6 CCR 1007-1 Part 01 or 6 CCR 1007-1 Part 10.

1806 **History**

1807 Part 18, Rules 8.1 – Appendix A, Criterion 9 eff. 04/30/2011.

1808